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Syme Memorial Lecture.[1]

THE MILITARY SURGEON: HIS SELECTION, TRAINING AND THE SCOPE OF HIS WORK.

By W. A. HAILES, C.B.E., D.S.O., F.R.C.S., F.R.A.C.S.,
Brigadier, Australian Army Medical Corps.

IT would be idle and presumptuous for me to attempt to enlarge on the many outstanding features in the life and character of the late Sir George Syme; these have already been extolled by his contemporaries and friends. It will be remembered that amongst the earlier Syme Memorial Lecturers were some well-known masters of English and it was with a considerable degree of trepidation that I accepted the invitation from the Council of the Victorian Branch of the British Medical Association to deliver the seventh Memorial Lecture. That I should be selected I regarded as a very great honour; how that task could be best accomplished was another matter, one that caused many doubts and anxious moments.

My knowledge of Syme was limited to association with him as a student and later as house surgeon at the Melbourne Hospital in the eventful year 1914, just prior to his embarkation with the first Australian Imperial Force, as officer commanding, Surgical Division, Number 1 Australian General Hospital.

No useful purpose will be served by a reiteration of the manner in which his outstanding qualities impressed the students and young graduates of that decade, for he was then at his zenith.

The years 1914-1918 and 1939-1945 represent nightmares which fortunately are passed, and thanks to the manner in which the British Empire and her Allies answered all the calls of their leaders, civilization as we know it still exists.

I thought it might be of interest tonight to discuss with you what in my opinion is required of the military surgeon in cataclysms such as those of 1914 and 1939. For that reason I chose the subject for my lecture "The Military Surgeon: His Selection, Training and the Scope of His Work".

It would be well to emphasize at this juncture, and not at the end of the lecture, that should anything be said that would appear to imply that Syme in 1914 was too old for military service, it is only necessary to remind my audience that the story of Number 1 Australian General Hospital in Egypt in 1915 instanced Syme as one of the exceptions that prove the rule that military surgeons should be young if they are to serve abroad.

Those who were responsible for the selection of the surgeons for the military hospitals may, too, be resentful that the selection is possibly criticized in a general and completely impersonal way. I can only say to them that had I been responsible in 1939 for the selection the same team would have been chosen. I do consider, however, that should a similar occasion ever again arise a different viewpoint should be taken.

In 1914 and 1939 volunteers were called for an expeditionary force which included certain hospitals. The occasion was such that the response was immediate and some hospitals left Australia overloaded with surgical talent. This plethora of what may be called hospital honoraries on the surgical staff of the first hospitals formed has become a usual feature in military hospitals in the Australian Army Medical Corps. It is a disconcerting factor in the medical life of the community in a period which people now choose to call one of total war; it would be interesting to know when war was not total war within the scope of armaments then available.

Let us consider what are the necessary attributes of a military surgeon. Last and not first will be mentioned reaction to danger; this is unpredictable in a great many instances unless the man has been tried out previously.

[1] Delivered at the Medical Society Hall, East Melbourne, on Wednesday, August 6, 1947.

Ability, training, youth first and foremost, character to inspire and teach others, to be able to lead a rally or command a team—these are the first essentials.

Ability.

That the surgeon chosen should be able, goes without saying; the wounded soldier fighting in the cause of his country deserves the best available. It is necessary to remember, however, that conditions on service change so quickly that ability and imagination must be given every chance to modify treatment according to those conditions, always provided there is some control, which, if firm, must be sympathetic because much that is of value is suggested by those whose mind is not in a groove, even if they are not yet hospital honoraries, and they must not be discouraged.

Training.

A correct surgical training is essential. There are some who would ask: What is a correct surgical training? It includes a detailed anatomical knowledge; the war wound is from all angles and the surgical approach one that the occasional operator never envisaged. The practitioner who is looked on as a fairly competent surgeon, though only really an occasional operator or one whose activities are restricted to certain set operations, is difficult to place; he knows the anatomy of the field of surgery he exploits, but little of the vessels and nerves of the extremities, and because he has done his work in that field satisfactorily for so long, is not very keen to delve into the anatomy and surgery of vessels, nerves and joints.

Provided that he has a sound anatomical knowledge and has served a reasonable surgical apprenticeship, youth must be preferred. The training required is that of first principles with particular regard to traumatic surgery. There must be a technical and clinical aspect to surgical education and the education of few young surgeons is now complete unless it includes a period of training, not as a resident, but as an assistant or apprentice to a surgeon and clinician of standing. A period spent in a septic ward is invaluable; the military surgeon must be able literally to scent pus, as a sporting dog the quarry the sportsman does not suspect. A good junior with an adequate training and a little experience fits much more readily into the unusual conditions than those with ways already set and surgical outlook limited to the set operations common in civil life. As time progresses any stature can be grafted on a proper training.

Youth.

When military hospitals are assembled to accompany an army, the natural tendency is to think of the staff in terms of hospital honoraries. Lay people and the medical profession also think of the surgeon they would desire, if in need of surgical aid, and are aghast if that talent and that experience are not there. That talent and experience must be there in limited amount and chiefly to direct and advise the younger men, in other words to lead the team but not to dominate them.

It will be said by some that war surgery is difficult; provided advice and supervision are available, this is not so.

Resuscitation which is so essential has always been carried out most satisfactorially by keen juniors. Just how well the restorative and reconstructive work, which should probably always be done at a base, can be done by juniors, has been shown by the young plastic, orthopædic and vascular surgeons working as a team under a chief capable of inspiration, keen to delegate, assist and encourage. The life of an army surgeon is not all surgery; in many instances it is long periods of boredom with sand, flies, mosquitoes and discomforts abounding, and shorter periods of great activity.

Most surgeons, indeed most medical men, are individualists and the less the development of this trait, the more adapted they are for military life; the younger man is not so set in his ways, is less in a groove, is in all aspects more adaptable.

It is not simply a question of a mind being still receptive, the picture of military life and war surgery is so kaleidoscopic that something more is needed; the mind must still be imaginative, despite hardships and frustrations, if the best is to be gained. There is a need to be abreast of the surgery in the opposing camp, not a year behind it. Youth is readier to perceive and quicker to initiate though it is true that some supervision is necessary.

In what manner does military rank influence the problem?

If the best use is to be made of selected young men who have proved their academic worth and ability to fill the posting, they should be given the rank and pay of that posting and adequate recognition should not be prevented by their lack of seniority on a corps list.

There should be a general list and a specialist list. I know that it may appear unfair that those who spend their Saturdays and holidays in peace time preparing for the defence of the nation should suffer in a professional capacity in war time, but it must be emphasized that surgery requires special knowledge and training and cannot be performed adequately by those who lack these prerequisites.

Character.

Youth must have the personality and presence to inspire those with whom it works both in a professional and military capacity. There is much to be done that is not professional, laying out a hospital site, control of working parties *et cetera*.

It has been said that war can be described as a mixture of periods of boredom interspersed with those of fear, and it is unpredictable how officers and those in the ranks will react to these.

High morale, about which Viscount Montgomery has spoken so much and which he has inculcated so thoroughly into those whom he commands, is dependent on much more than the banishment or conquest of fear.

In "Morale in Battle" in the *British Medical Journal* of November 9, 1946, Montgomery states: "It is necessary now to make clear what high morale is not. It is not contentment or satisfaction bred from ease or comfort of living. Both of these contain a hint of complacency or acceptance of luxury as an end in itself. High morale is far more than any of these for it implies essentially the ability to triumph over discomforts and dangers and carry on with the job."

The ability of an officer in the Army Medical Corps to rise above his surroundings under any conditions is essential if he is to be a success; this indeed is measured by the efficiency of his unit. At the risk of pointed and caustic criticism, I wish to make it very plain that, with the exception of regimental medical officers and certain others in really front line units, the medical profession as represented by the Army Medical Corps is a relatively privileged section of the community in war time and, with the exception of those regimental medical officers and others referred to above, is in relatively safe areas with less liability to death, wounding or capture, than the majority. Fear of these consequences then should not often be a factor, but inability to live the life, whatever that may be, kills all morale.

The living conditions of those who serve in the Medical Corps are or should be more congenial and less irksome than is the case in many sections of the army, there are greater opportunities for relative cleanliness both in living and in the preparation of food. The medical units are on lines of supply and evacuation, there is usually some shelter and protection from the vagaries of the weather, while the constant traffic through the aid post or unit affords variety and company.

It is because I consider that the junior members of the medical profession are in a relatively fortunate position in war time, as compared with junior graduates from the other faculties and youth in general, that I passed lightly over the question of greater recognition for the young officer doing special work but with no seniority at all on his corps list.

The man who is an intense individualist is more likely to be one who cannot live the life on real active service, especially if he is getting on in years, than the younger man who has more recently roughed it in holiday camps and the less luxurious holiday resorts, though it must be admitted there are astounding exceptions and anomalies. Whatever his professional status at home, he must be prepared, should the need arise, to be a junior member of the team as measured by the professional status of the posting allotted him. It was here that Syme showed how thoroughly he could sink his individuality and play for the side in those days of boredom in Cairo in 1915, when he took charge of the camp for measles and venereal disease patients and filled his position with that degree of efficiency he brought to bear on any undertaking. I do not know the real details of that incident or of many of the happenings in that then unfortunate unit and I am not attempting to justify the posting, but rather emphasizing the reaction of the senior surgeon who certainly showed he could sink his individualism and play for the side.

I know full well that this aspect of one's character is almost as unpredictable as is reaction to fear, and in war time is just as important.

The first indication of failure in this regard should be reprimanded and persistence therein should preclude promotion, despite the seniority list and its public service ideal.

There are those who will maintain that in "total war", as they are pleased to call it, the risk everywhere is equalized and that those in the rear areas are anything but safe; they will prove that there are more civilians in the casualty lists than members of the services, This may apply for certain areas only, but as an all-over estimate do not believe it—war was always total war within the compass of the weapon known at the time. The stakes are too high, the life or death of the nation, for it to be otherwise. It is of course admitted that some nations have employed degrees of barbarity to which others have not descended, but these acts have not in the end succeeded.

There are misfits in all walks of life and at all ages and this is true of army surgeons; but there are fewer amongst those who are young, who mix easily with their *confrères* in the mess and who are not marked down to be lone wolves.

That there must be one or more senior or really good surgeons of the honorary class in each hospital is essential, for they have the ability to inspire others to teach the juniors and to judge who amongst the latter is the *protégé* and who the menace. The senior must be unselfish and not only able but willing to delegate work to others; once he is certain that those under him are capable of doing the work, he must teach others if they are available.

The senior surgeon who adopts the attitude that he will do those operations because no one else can do them as well as he, is just a menace and a hindrance in the hospital, provided there are others capable. If that attitude is persisted in, then in busy times the waiting list gets longer and longer and the bottle-neck at the theatre progressively more congested. The technique of war surgery is not so insuperably difficult that the senior surgeon must do everything. It must always be remembered that the strain on the profession has reached the bases and teaching hospitals at home, that post-graduate teaching is disorganized and the Army must train its own replacements; this can be done only by the senior surgeon adopting the apprenticeship system and attaching to those surgeons who are competent promising juniors. This apprenticeship method is the only way in which surgeons can be trained in an army in action or on active service; it has of course been the method of training in vogue since the time of Paré, Larrey and others. I am trying to emphasize that two or three good general surgeons who are of the out-patient rather than in-patient category should be ample for most hospitals provided there is posted to the hospital a suitable complement of competent juniors who have already had the elements of a post-graduate surgical training and served an apprenticeship. The responsibility of seeing that the professional potentialities of these young surgeons are used to the full must fall on the leaders of the Medical Corps in the field.

The Place of the Specialists.

The maximum value in a life-saving capacity must be obtained from those surgeons who can be transported and maintained with an adequate staff in the forward operating station, and it must be remembered that transport and supply are difficult.

In times of stress the rule must be the greatest good to the greatest number, with a fair deal to all who have a chance of recovery. This implies life-saving operative work and not long reconstructive procedures or intricate neurosurgical operations which should be carried out in peace and quietude. This means that the specialist must be stationed somewhere on the line of communication or at the base if air evacuation is available.

Where the specialist will be stationed will depend on the geographical site, the nature of the terrain, line of communication and the efficiency of the air or rail evacuation. It would be useless and impossible to scatter specialists if such were available all over a battlefield; furthermore, unless they had a theatre for their sole use conditions would be unfavourable and trouble arise.

Some of the specialists are very sensitive and resent somewhat being restricted to work at the base. All will admire their keenness to be with the troops. It must, however, be remembered that they are members of a team and the heart does not rule the head in times of war.

Officers who were in charge of surgical divisions and the special branches of surgery showed their intense disappointment when told their job was with their unit directing others and not as singletons in a forward battle station; they did, however, in all instances forget it and did their best up to the hilt.

It is, I consider, a reasonable criticism by some of those who were endeavouring to carry on in civil life doing much of the surgery performed by medical officers who entered the army, that the most is not made of army surgeons, that too many are enlisted and that the set up is too inflexible, that surgeons are not moved from one hospital which is inactive to one that is very busy, in other words that the army does not use what it has.

The movement of small lots such as surgeons and their medical orderlies and nursing staff necessitates transport by car, truck or plane, and in battle transport is always in very short supply.

It must be remembered by those critics that all else is secondary to winning the battle; the responsibility on the commander in the field is enormous in this regard. The responsibility for the adequate surgical treatment of the wounded is transferred to the leader of the medical corps, who must be able to assure his chief that all hospitals in the area are capable of dealing with a sudden rush of casualties.

Theoretically in war time it should be possible to transfer surgeons by plane from hospitals very far away, but in actual practice there are very great difficulties, not the least of which is the necessity for almost absolute air superiority. The more rapid transportation of surgeons from areas of inactivity to the battle front is essential and is one sphere of activity in which some progress should be possible.

Lest it be said that I am leaving the immediate surgical treatment of the wounded to young relatively inexperienced surgeons, just consider for one moment what is required.

A young surgeon who has completed a reasonable post-graduate training has an adequate knowledge of anatomy at his finger tips. His recent studies will have made him thoroughly conversant with surgical pathology, including of course inflammation in all its phases and the chemotherapeutic measures for its control. He will have gained experience of modern methods of resuscitation and a technical and clinical experience of all modern general surgical procedures, including operative experience

of civilian surgery, and will have acquired the ability to sew.

The good junior will have developed by now a keen clinical sense to observe and to draw deductions, and above all will have, if well selected, keenness and the will to win and to get on with the job, however short of the ideal conditions may be, and with guidance that is most of what is required.

Leadership and ability to organize count for much. Both in military and civil surgery, it is true that a badly organized clinic or unit is never efficient; without these the turnover falls far short of the maximum which the unit could achieve, and the standard falls.

It will be at once apparent that the basic requirements are not overwhelming provided ability is fostered.

If the officer realizes that he should in quiet periods mix with all in the athletic, intellectual and social life of the unit, he will be of greater value still. Every lone wolf is a misfit who spells inefficiency and is one whom the unit is better without.

In England and the United States of America much of the difficult surgery at the base and special hospitals was done by young men under the guidance of an able, inspiring and sympathetic mentor, and the excellence of the work was eye-opening. This was evident in orthopædic, neurosurgical and vascular units. Perhaps an illustrative example will help to emphasize this. I visited in America in 1945 a vascular unit of the Medical Corps of the Army of the United States; the surgical work was all done by the chief and two young assistants, who had been selected by him from his knowledge of their work at his hospital in a State in the south. I mention this in case it is thought that these young men had served all their training at Columbia or Cornell Medical School. The hospital in which they trained as interns and residents was in a town somewhere between one-third and one-fourth the size of Melbourne, according to an American atlas I was interested to consult. The surgery was the most difficult vascular surgery; the age of one was thirty-three years and of the other twenty-eight.

This was the first of these special hospitals I saw in America; I was astonished and, as can be seen, asked many pertinent and almost rude questions. These young surgeons were the products of the resident system in the United States of America; they came from a school served by a whole time staff—the apprenticeship system *par excellence*, the foundation of the teaching of surgery in America, the Halstead tradition. I saw their like all over the country. There need be no fear of entrusting this type of surgery to youth properly trained, selected and guided.

It remains for us in Australia to see that a similar training is possible for those who can make the grade and have the will to win.

Should the occasion ever arise, and we fervently hope it never will, the men will then be there ready not only for selection as army surgeons, but to carry on the tradition of their training in their new sphere. It must be remembered that post-graduate training in surgery and the specialties ceases to all intents and purposes in civilian hospitals or in medical centres in war time.

I am approaching the retiring age in the hospital honorary class, the sear and yellow shall we say, and know and have seen some at least of the changes wrought by time. At the termination of the 1914-1918 conflict and in 1945 practically all the men in the forward areas in the surgical service were young men; let us commence in future, should it be necessary, with less seniors and more well trained juniors in reponsible positions. These men have vigour, imagination, the will to win and to overcome the novel primitive conditions. As I have emphasized, this implies an obligation on the profession, namely, that the juniors be adequately trained and given their opportunity; not till then is it reasonable to expect the services to accept them in these positions. Opportunities for training in clinical and technical surgery are gradually becoming available in Australia, but not to a sufficient extent everywhere. A further development is necessary in order that our successors be adequately trained, and I wish to draw the distinction between teaching and training; the latter applies apprenticeship.

Be it always remembered that as far as possible they should commence where we leave off. It is our duty to train our successors and by that I do not mean only future appointees to our own teaching hospital.

Surgeons in the clinical schools have an obligation to the keen young men who go into those country towns which are equipped with base hospitals, or to the larger suburban centres. If they are prepared to work for higher degrees, then an apprenticeship training should be readily available to all who make the grade.

This is due not only to the juniors in our profession, it is something we owe to our teachers and above all to the public of Australia, namely, that wherever there are those facilities that can be provided in a base hospital, there should be available a surgical staff whose members have been thoroughly taught and trained. This cannot of course include all specialties. That must be determined by the demand.

It is as well to remember that there are many calls on the surgeon's time and that they are more administrative than surgical in nature; these are time-consuming and essential for morale and discipline. The chief of these is membership of medical boards to determine the category of the soldier who is considered to be unfit by his combatant officers or pleads unfitness or needs to have his category redetermined after injury or illness. This is tedious, exacting and unsatisfactory work. A soldier, like a medical officer on active service, is only as good as his physical condition will allow or, if that is reasonable, as he elects to be; this is said with due deference to the psychiatrist.

Prior to 1914-1918 when nations fought with smaller armies, the soldier who was not perfectly physically fit was written off as a fighting soldier and was discharged or given a job in the rear; there were apparently then proportionately enough fit and willing to ensure full ranks in the front line. This is by no means the case in modern warfare with literally millions of men involved.

The whole nation is in it up to the hilt, the determination who shall serve in the front line and who in the factory at home is very unfairly arrived at. In the early days those who answer the call are taken and those who cheer the politician as he proclaims: "No man shall be sent out of Australia", stay behind till home is in danger and they are then caught up in a draft should they happen to be unlucky and not in a reserved occupation. All this is obviously unfair; the unwilling soldier hates it all and would be so much happier at home earning the big money. Many would say let him go, he is useless anyhow, just as they would say the same of the questionably fit man who pleads either fitness or unfitness, as the case may be, but is of doubtful value.

It is impossible for the army to accept this outlook; to pander to it would render the force a rabble. The determination of fitness or otherwise becomes very largely the duty of the medical officers who constitute the boards. One of the medical members of each board is usually a surgeon. It can therefore be readily appreciated that when the army is not in action the surgeon may be very busily occupied indeed, and those who criticize should recollect that it is seldom at the practice of civil surgery.

Experience at boarding is not readily gained and those who become proficient are valued.

Summed up in a nutshell, the duty of those boards is not to send the soldier off to hospital for this and that minor operation to make him a perfect physical specimen or to remove some prominent blemish from the young Adonis, but it is to keep a maximum number of reasonably fit men in the front line or with their units.

When the force is being trained or hardened for action of a particularly strenuous character, there may be need to alter this viewpoint, and it has happened that the entire force has to be reexamined and classified on a higher standard at the direction of the General Staff.

It is often claimed that all doctors should be given a chance to serve and that when surgeons and medical

officers have been in the services for a stated period they should change with those in civil life. This would on the surface appear to be just not only to the soldier but also to the civilian. It is my fixed opinion that this could never be. The measure of the newcomer's deficiency is determined by what the original learned of the army and its ways in his years of service. That a system of replacements for long service is possible must be admitted though difficulty will arise over rank and lack of military experience, not necessarily surgical, amongst the newcomers who could only be absorbed in small doses.

All that has been said applies to the military surgeon on active service and is not intended to apply to the civilian surgeon doing part-time military duty at home. Here is the place for the seniors in the profession; they are wanted and have done outstanding service in the base hospitals.

It would appear that even those whose voices were raised loudest in the cry of "No man to go overseas to fight" have learned what was really self-evident, namely, that it is much better to fight for Australia out of Australia than in it, so that there is likely to be less opposition next time to hospitals and troops proceeding overseas.

A body such as the Central Medical Coordination Committee must be ready from the declaration of war to act with the army, to see that there is a fair balance of surgical talent in the forces overseas and in Australia, and also at home, because when nations fight it assuredly will never again be like a tribal battle.

Such a committee has a right to expect not only that full use will be made of the developed and potential surgical ability in the forces, but that apprenticeship training will commence at once in view of the fact that all organized post-graduate training virtually ceases.

The army must cooperate not only in this but especially in the provision of greater facilities for the movement of competent members of the medical service long distances, if need be, at very short notice. In no other way can the best be achieved.

Difficulties of the commander of the Army Medical Corps in the field are very considerable. The force has a certain allotment of medical officers according to its size and there is no establishment for any captains as apprentices to the surgeons in the hospital.

The captains on the strength of the medical units are required to fill all the vacancies caused by illness and injury and the force is seldom up to establishment in junior medical officers. Each unit in the forward areas must possess a regimental medical officer. In a great many instances the man who would prove an excellent surgical apprentice because of those very qualities which would make him such is equally efficient in the forward units and so good that he is retained for field work in the ambulances, and has soon earned such promotion that it is impossible to place him in a hospital with that rank because he is unable at that stage to fill the position of a major in the surgical division.

Room can be made for a spare captain almost anywhere, because in spite of what is thought at home, medical units in the field are seldom up to establishment. Many senior officers take the point of view that young men should be in the forward units or spend a fair period in those units and do not welcome young officers on the permanent staff, so to speak, of the hospital unless this qualification had been fulfilled. This does not make it easy for the junior given a selected appointment, and penalizes the young officer who goes forward and quickly earns promotion. There is a demand for all combatant units to be up to establishment early in the campaign, there is the anticipation that next week may see them in action and none knows which units will be called first. It is then that there are most calls on the good juniors in the hospital and some are lost to the field units for the rest of the campaign; this is inevitable.

It would be unfair to refer, as I did, to the restrictions in promotion consequent on the seniority on the corps list without realizing that method of promotion had some redeeming features. It can stand as a sheet-anchor against nepotism from without whether political or social.

The commander still has the power to nominate a particular officer for a posting on the establishment and so can reward ability with the temporary rank of that posting. There are no such postings for learners or apprentices to surgeons.

The seniority list always appeared to me, when I discussed it with officers in the "A" Branch, to be as the law of the Medes and the Persians, and I rather came to the conclusion that if it placed undue emphasis on length of service it at least eliminated outside influence.

Amongst those who are considered to have the necessary qualifications, which group of men will be selected and which left at home? This raises many heartburnings, in some instances sense of injustice and definite disappointment.

It has become evident that those who volunteer at the outbreak of hostilities are in the army for the duration, they sign an attestation form for the duration and one year thereafter and that is significant.

As more and more hospitals are formed and staffed, those who are not selected or, for various reasons, were not amongst the early volunteers become so essential on the home front that they fall into the same category as the men in reserved occupations.

The public hospitals must be able to carry on efficiently; after all, the civilian population must be adequately cared for and undergraduate education continue. Were it otherwise, there would be not only unrest and discontent, but no reinforcements for the Army Medical Corps in the field, for the recent graduates are the only source of supply. The strain on the medical profession increases. Unfair as it appears, there is very little chance that those who did not volunteer early will be included in the forces; and more invidious still is the position of the man who did enlist, was not selected and then became so essential to his hospital or to the public that the coordination committee would not release him except on exchange.

Release from the army is difficult even if there is a replacement available. It is very bad for morale. If it is to apply to the Army Medical Corps, why not to other sections of the service, for we have seen that the Medical Corps is already rather privileged? All efforts must be directed towards increasing, not decreasing morale.

When wars last for four and five years, as the danger increases the effort is enlarged from a volunteer force to one of a national undertaking with a call up of drafts according to age and occupation. The terms volunteer and conscript are then invidious; many young men are thoughtlessly and harshly termed conscripts because of the period at which they joined. They were ineligible before owing to their age or in the case of medical students because of a course not yet completed. When armies were small volunteers were preferred to conscripts and, it is true, many still prefer them, but the last war showed that the difference is negligible; it is the leaders and officers who count. If the public and politicians will recognize that war is really total war, and that the very safety and life of the nation are at stake, surely there can be only one reaction, however close the next election may be. A total effort is required to meet the threat from the day war is declared. That effort is needed on the home front as well as in the services and can be met only by conscripting the nation and calling on the best available. Then we should not see the junior partner left at home to carry on the practice and the hospital while the senior departs on service, when it would often be so much better the other way round.

There would be a more equitable adjustment between those needed for the services and for the civilians.

There would be an end to the complaints, some of which are undoubtedly true, that able young men volunteered early and were never selected.

The *élan* of the volunteer service would then be eliminated, but it would be a total effort. What can we hope for? At present there is not even compulsory military training.

In conclusion, I would like to add that all that has been voiced tonight may be hopelessly incorrect; but it is due

to the nation and the profession that there should be a coordinating committee to act with the defence authorities as soon as war is declared, not when difficulties commence to arise. In no other way can the best be made in the two spheres of activity, civilian and military, of the surgical material available.

Reviews.

ANÆSTHESIA.

Medical synopses are not easy either to write or to read. Their utility is greatest when the reader already has knowledge of the subject in question. Nonetheless they serve a useful function in the literature of medicine. To that literature Dr. J. Alfred Lee has contributed materially by his "Synopsis of Anæsthesia".[1] Whilst he addresses himself primarily to the student, resident anæsthetist or candidate for a diploma in anæsthesia, his book will be welcomed by the professional anæsthetist. Its 230 pages cover almost the whole field of modern anæsthesia.

The volume is of pocket size and is meant for quick reference rather than for continued reading. Its print is therefore very small, but clear. Binding, paper and format are excellent for a book so inexpensive. The illustrations are disappointing, being taken from photographs or line-drawings of the exterior of apparatus and giving no clue to its internal structure or principles of operation. Misprints are few and seldom leave the author's meaning in doubt. On page 14, for example, "Carbon" obviously stands for "Carbon dioxide". On page 41, however, it is said of "Vinyl ether" that "in light anæsthesia, breathing [is] more rapid and shallow than normal". This is perhaps a misprint for "in deep anæsthesia", of which such breathing is pathognomonic.

The book opens with a history of anæsthesia, presented unusually and effectively by means of short biographies. The physiology of respiration is then ably described. Anatomical and physiological considerations are rightly emphasized throughout the volume, although the anatomical detail is perhaps greater than is needful. After adequate discussion of the pre-anæsthetic care of the patient, premedication and the principles of inhalational anæsthesia, the author proceeds to describe the several anæsthetics and the apparatus used for their administration. His account of the endotracheal method is excellent and he gives a well-balanced description of intravenous anæsthesia. Spinal analgesia, of which the author is a well-known exponent, is particularly well described. There is a very full account of the various procedures of regional analgesia, each being prefixed by a review of the significant anatomical considerations. Other chapters deal with the choice of the anæsthetic, shock, explosion during anæsthesia, the management of the unconscious patient, curare and obstetrical analgesia. The index is comprehensive.

The arrangement of the subject-matter is not always happy, since cognate topics are often widely separated. Thus shock (Chapter XXI) might well have been taken together with the accidents of anæsthesia (Chapter IX) and the scope of analeptics (Chapter XIV). The author sets out to describe almost all the recognized methods of anæsthesia, presumably for the benefit of candidates for the diploma. In consequence, the reader is sometimes left in a state of indecision. Thus in Chapter XXII various endotracheal, endobronchial and tamponage techniques are described for use in thoracic operations, but there is little attempt at comparative valuation. Similarly, in Chapter XXVII, no less than seventeen methods of obstetrical analgesia or anæsthesia are described. The reader, lacking guidance, is left wondering which of them are actually used by the author in his practice, and why.

It is apparent that the author is an anæsthetist of skill and experience, conversant with modern methods. It is therefore curious that he should give space to methods now outmoded. Perhaps he does so for the sake of diploma candidates, describing every method which they might chance to meet in hospital work or at examination. The point is illustrated by the acceptance of single-dose administration for tonsillectomy or dental extractions (page 42) and of nitrous oxide-air anæsthesia conducted with Barth's three-way stopcock (page 77). Nitrous oxide and air anæsthesia receives detailed consideration for minor procedures of dentistry (page 83). Much less is said about the current use of nitrous oxide and oxygen in these cases, given under positive pressure from an intermittent-flow apparatus such as McKesson's. The use of carbon dioxide to shorten the time of induction is permitted, even with such potent agents as chloroform (pages 31, 34, 49); this advice is apt to lead the novice into serious difficulties. Again, the author recommends the use of rebreathing in gas anæsthesia by the continuous-flow method (pages 24, 27, 79), although most anæsthetists now believe that quieter respiration and less expenditure of muscular energy occur if it is avoided. The author likewise shares the predilection of many British anæsthetists for comparatively small flows of gases in continuous-flow administration. With the minute-volume of five litres of nitrous oxide and one litre of oxygen, recommended on pages 35 and 68, partial rebreathing is almost inevitable in most adults. Current ideas would here require at least eight litres of gaseous mixture per minute. Yet again, the author accepts the traditional use of glucose (pages 208, 218) and saline solution for proctoclysis. Glucose has been shown not to be absorbed from the rectum, whilst the addition of salt only hinders the absorption of water.

The account of the widely used ethyl chloride and ether "sequence" on page 34 would not be acceptable in this country. Carbon dioxide absorption anæsthesia and "controlled" respiration (Chapter VII) are described rather sketchily. It is curious to note that, on page 55, an increase in size of the reservoir bag is given as a sign of chemical exhaustion of the soda lime. It is an accepted sign of an excessive "basal" supply of oxygen, but is new in connexion with carbon dioxide. Were this gas to accumulate in the bag until its percentage had reached five, by which time gross hyperpnœa would have been long evident, the bag would show only a one-twentieth increase in size, which would hardly be recognizable.

The pharmacology of curare (Chapter XX) is well described. Its clinical use is treated less helpfully, but that is not surprising: one's views upon this revolutionary drug are necessarily in a state of flux and the time-lag in the preparation of a book is sufficient for their extensive modification. The curare content of "Intocostrin" is given on page 203 as 10 milligrammes per cubic centimetre. On page 205 it is given as 20 milligrammes, which is correct.

It is probably impossible to write a book upon anæsthesia with which all anæsthetists will agree. The criticisms made above should not be taken as depreciating the general value of Dr. Lee's "Synopsis". He has produced a most comprehensive and useful epitome of the subject. He has, in general, given evidence of encyclopædic knowledge and sound judgement. He is to be congratulated upon a work which will have wide appeal and definite utility.

[1] "A Synopsis of Anæsthesia", by J. Alfred Lee, M.R.C.S., L.R.C.P., M.M.S.A., D.A.; 1947. Bristol: John Wright and Sons, Limited, London: Simpkin Marshall (1941), Limited. 7¼" × 4¼", pp. 264, with illustrations. Price: 12s. 6d.

THE EXAMINATION OF THE NERVOUS SYSTEM.

The appearance of an eighth edition is sufficient evidence that Professor Monrad-Krohn's "Examination of the Nervous System" continues to retain its place.[1] The seventh edition was published in 1938, but was reprinted several times.

Although alterations and additions have been made throughout the book, angiography according to the method of Egas Moniz is described as perhaps the greatest advance in intracranial diagnosis. Not all neurologists and neurosurgeons will subscribe to this opinion, but Professor Monrad-Krohn finds that "Perabrodil" is free from the risks and disadvantages of certain other opaque substances and uses it freely in the investigation of cases of possible intracranial tumour, aneurysm and subdural hæmatoma. Attention is also drawn to the importance of X-ray examination of the lungs because of the relative frequency of metastases in the brain. Throughout the book differential diagnoses are discussed concisely.

The diagram of cortical localization could with benefit be accompanied by a map of cortical areas distinguished by numbers according to the researches of Campbell, Brodman, Voght, Foester and others. In the section on the measurement of intelligence the Binet-Simon scale continues to be the standard recommended for general use, although Dr. Monrad-Krohn refers to Raven's progressive matrices. The author has probably shown wisdom in refraining from expanding this section.

Like its predecessors, this book may confidently be recommended to senior students and particularly to those who are taking up the study of clinical neurology as a specialty.

[1] "The Clinical Examination of the Nervous System", by G. H. Monrad-Krohn, M.D., F.R.C.P.; Eighth Edition; 1947. London: H. K. Lewis and Company, Limited. 7¾" × 5", pp. 400, with many illustrations. Price: 16s.

The Medical Journal of Australia

SATURDAY, OCTOBER 18, 1947.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

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HEALTH EDUCATION.

THE word education means different things to different people. It is not uncommon to hear the remark that a man, let us call him Mr. X, was educated at So-and-So School. Others recognize that education is a process which should last throughout life. Mr. X's education may have been started at the school in question, but it may not. Education is sometimes confused with instruction. Teachers may be instructors or educators. Government departments in some of the Australian States have the title of Department of Public Instruction. Sometimes these departments are dignified by being called Departments of Education; the dignity may or may not be deserved. To impart knowledge is one thing; to see that knowledge is absorbed and made to have an influence on life and character is something greater and more difficult. Knowledge in the abstract, knowledge unapplied, is like a tree without fruit, the kind of tree, mentioned in Holy Writ, which was to have been cut down, and of which the question was asked: "Why cumbereth it the ground?" Thus a grave responsibility rests upon the teacher, or as perhaps we should call him, the educator. The educator, he who should lead the pupil in his development, must exercise a wise choice in what he would teach. He must, as we were reminded not so long ago by Sir Richard Livingstone, remember Plato's contention that it is not the life of knowledge, not even if it includes all the sciences, which creates happiness and well-being, but a single branch of knowledge—the science of good and evil. Livingstone wrote in his "Education for a World Adrift" that the great task of the present generation is to find a principle that will rule life. This, of course, will include the life of the individual and also collective life, the life of the community. Livingstone holds that it is necessary to realize that we are in the midst of two revolutions, the one social, economic and political, and the other spiritual, "the weakening or the dissolution of the traditions and beliefs which for many centuries have ruled western civilization and held men together". In his progress through life man has many educators (he may on occasion by an analysis of experience be his own educator), and these educators should minister to every side of his nature. It may be asked what this has to do with medicine. Man has both body and mind and medicine ministers to both. It ministers to man as an individual and in his communal relationships. It ministers to him by seeing to it that his body is able to stand up to the stress of life and his mind to "the bludgeonings of chance", so that though his head may be "bloody", it is still "unbowed". What is commonly known as health education has not always such a wide connotation as this. However that may be, most people will agree that education in health matters must be regarded from the same broad standpoint as education in any other field.

The general recognition some years ago of the importance of preventive medicine brought with it a realization that if disease and disability were to be prevented the people would need to be taught something about the subject—what was to be avoided, why it was to be avoided and how. The Royal Commission on Health, appointed by the Commonwealth Government, which issued its report in November, 1925 (see THE MEDICAL JOURNAL OF AUSTRALIA, January 16, 1926, page 55), devoted a special section to "The Publication of Information Relating to Public Health", and made certain recommendations. Ever since then the "education of the public" in matters pertaining to health has been the subject of many articles and addresses published in this journal. An opportunity to discuss what is meant by health education has been afforded by the publication of an interesting series of statements in the official journal of the American Public Health Association.[1] In an editorial we read that health education is the newest of the professional specialties to be developed as a basic and essential element in the public health programme. As an indication of the way in which this public health programme has expanded, it is stated that early in this century the specialists concerned included the sanitary officer (sanitarian), the bacteriologist, the physician and the nurse. Now there are educational qualifications set out by the Committee on Professional Education for thirteen different types of specialists. Today the health educator is one of those listed with others in the accepted minimum standards for every health programme. In order to clarify the position, or, as he puts it, to see what all the "shouting" was about, the editor invited fourteen leaders in health education to prepare brief answers to the question: "What is Health Education?" The replies are published as a symposium. They are of interest because they are written from different points of view—those of the health officer, the physician, the nurse, the health council executive, the faculty member of the school of public health, the expert in school health, and the United States Public Health Service. When these definitions with their short explanations are read and considered as a whole, they show the truth of our contention that education in matters pertaining to health should be regarded from the same broad standpoint as education in any other field.

The ways in which health education is regarded are explained by Dorothy B. Nyswander, Ph.D., of the School

[1] *American Journal of Public Health and the Nation's Health*, June, 1947.

of Public Health in the University of California. She points out that to one person health education signifies the health teaching procedures which are carried out on behalf of people. To another it signifies an "intangible summation of experiences which have left their mark on a person's behaviour with regard to health". A third concept, and the one to which Nyswander herself subscribes, is that health education is a process of change within the human organism itself which is related to achieving personal and community health goals. We may describe these three ideas in the following way. The first lays emphasis on the work of teaching, on the activity of the educator. This is the aspect of the subject on which stress is always laid when medical practitioners are exhorted to a display of interest and to good works in their several spheres. The third aspect (to take them in their proper order) emphasizes the process that goes on in the mind of the person who is being educated. Nyswander points out that teaching and learning are not the same thing, and that in the last analysis learning takes place only through the efforts of the learner. It seems that these two ideas of Nyswander, her first and her third, ought really to be combined. A process of "leading out" implies someone to do the leading, although in the last analysis the result is contingent on the willingness of the person under instruction to be led. The second idea mentioned by Nyswander, that of a summation of experiences, views education in terms of what has been experienced; it will be entirely new to many persons. W. W. Bauer, M.D., of the American Medical Association, defines health education as "the sum total of all our experiences and motivations which add to health knowledge or influence health behaviour". This idea shows that, as Bleeker Marquette, Executive Secretary of the Cincinnati Public Health Federation, avers, health education is many things—not one. It leaves in the background the person who is being educated and on whom attention should always be centred, and this is perhaps a pity. Bauer does indicate the broad field that has to be covered by health education, and as the editorial expresses it, he emphasizes the fact that health education "includes the impact of the whole of life's experiences, as affected by a wide variety of forces bearing on the health knowledge and practices of the individual". One or two of the contributors hold that some of the forces which help to mould the health consciousness of the people are harmful in their trend. Among these are some forms of commercial advertising and some of the propaganda put out by those who are attached to certain cults. Another important point brought out by Mayhew Derryberry, Ph.D., of the United States Public Health Service, is that the good that has been achieved for an individual may be destroyed by hurried or inhuman consultations in a clinic or by a casual and superficial health examination. He refers to hard seats and long waiting periods in a clinic, and expresses the reasonable view that if service is rendered in a pleasant manner and meets the needs of the individual as he sees it, favourable attitudes or "positive education" will result. Clearly what is needed is to endow the learner, if possible, with an inquiring attitude of mind. If this can be done he will become an active participant in his own education, he will learn to recognize what is good, assimilate it and put it into practice. Without this process of ingestion and metabolism he will not attain his full stature as a healthy and useful citizen.

Current Comment.

THE COMMON ANATOMICAL LOCATION OF PULMONARY TUBERCULOSIS.

THE frequency of the pulmonary apex as a site for a tuberculous lesion in man has been the subject of much speculation, but none of the older theories seem able to stand close scrutiny, especially when their application is attempted to animals. A reasonable explanation has, however, been suggested by William Dock,[1] based on the distribution of pressure and flow of blood within the lungs. It has been shown that in animals with some resistance to tuberculosis the disease may become arrested in the parts of the lungs which are on a level with the heart, in the gravitational field, while it progresses in those parts which are farthest above the heart. In animals moving on four feet, progress occurs in the dorsal part of the upper lobe, but in those which are kept erect, even for half of the day, progressive lesions are extremely rare at the base and are frequent in the apical third of the lung.

In the human subject, sitting or standing, it is considered that the blood flow in the apical region of the lungs must be very limited. Moreover, because of the length and tortuosity of the right pulmonary artery, pressure on the right side will be lower and the bloodless region larger than on the left. This corresponds with the observed distribution of the tuberculous lesion. In the absence of resistance the disease is disseminated generally throughout the lungs, but where a degree of resistance is present preference for the apices, and especially for the right apex, is seen. Dock points out that alveoli which are aerated through the bronchi, but deprived of the normal flow of pulmonary arterial blood, with its low oxygen saturation, will have the lowest oxygen and highest carbon dioxide content. This favours the growth of tubercle bacilli. In the bloodless zone toxins will accumulate, while in other regions they will be diluted and carried away by blood and lymph. Lymph also will remove bacilli to regional lymph nodes, where their destruction leads to new formation of antibodies. In the ischæmic zone, the antibody level will be low, for the quantity of antibody and the number of phagocytes brought by the blood will be negligible. Only during activity or recumbency will the blood flow in the apical regions equal that in other parts of the lungs and restore to the apex its full measure of resistance. From this the significance of sedentary occupations and short hours of sleep is plain. Dock further draws attention to the rarity of active apical tuberculosis in the subjects of mitral stenosis and its frequency in the subjects of pulmonary stenosis. In the case of mitral stenosis, the associated pulmonary pressure is always high and it is "improbable that apical ischemia can occur in most of these patients". Pulmonary stenosis, however, so diminishes the pulmonary pressure that, even when the patient is in a state of activity, a degree of ischæmia is probably always present at the apices.

The significance of this hypothesis is far from being merely academic, and Dock points out the great importance of absolute recumbency, as opposed to a propped up or sitting posture, in the management of active pulmonary tuberculosis. He sees no objection, generally speaking, to the patient's being allowed out of bed for short periods for the purpose of taking a meal or visiting the toilet, but considers that when the patient is in bed the recumbent position is the one of election. Perhaps even short periods of recumbency, at intervals of a few hours, can lower toxin concentration and turn the delicate balance against progress of the apical lesion. The

[1] *Radiology*, April, 1947.

patient's cooperation is essential, of course, and it is desirable that other factors, especially the environment, should be acceptable. In this respect Dock makes a plea that the town-minded patient should not be exiled to a sanatorium in the wilderness; the rural atmosphere is helpful only if it is congenial.

A NEW PRINCIPLE IN COLOSTOMY.

The lot of the owner of a permanent colostomy opening is not an enviable one and any improvement on the standard methods of establishing the opening will be received with interest. A method based on a new principle has been described by B. K. Rank and Julian Smith, junior, of Melbourne,[1] the essential principle being the use of a skin tube as the terminal segment of the colostomy opening with the prospect of employing a satisfactory mechanical plug. The operation devised is in two stages. The first stage is the construction of a buried inverted skin tube. A rectangle of skin, approximately two inches by four inches, is designed on the lower left quadrant of the abdomen with its long axis slightly removed from the horizontal plane in a downward and outward direction. The centre of its upper and long side is at a point lateral to the rectus sheath where the bowel is to leave the abdomen. The ends of the rectangle are raised as two separate flaps of skin and fat, each flap containing slightly less than one-third of the rectangular area. When each of these flaps is turned back on its attached base, the free ends are sutured together to make a skin-lined tube. The raw rectangular surface is covered by a rectangular flap of appropriate dimensions transposed from the adjacent lateral area of skin; the centre of this transposed flap will overlay the raw outside of the skin tube. Its whole free margin is sutured to the defect, either to the edges of the raw area in the abdominal wall or to the circumference at each end of the skin tube, as is appropriate. The second defect is suitably closed. In the second stage of operation an inverted T-shaped incision is made immediately above the skin tube. The horizontal part of the incision in the diagram reproduced touches the proximal end of the tube; at this point a ring incision is completed around the proximal circumference of the skin tube. The end result may be described as an inverted T-shaped incision with a circular incision joined to and resting on the horizontal part of the "T". The flaps are turned back, the abdomen is opened and the free end of the bowel delivered through the wound. The bowel end is anastomosed to the skin lining of the tube, and the skin wound is closed so that the flaps are anterior to the bowel and the entire colostomy channel is buried except for its distal end. Various types of plug for the opening have been tried; the first, dental rolls of packed wool, were unsatisfactory, but more success has been obtained with rigid acrylic plugs combined with retention arrangements; however, the ideal plug is still to be found. Efficient control of bowel emptying has apparently been achieved and the skin has been found to tolerate both fæces and plugging with no untoward effect for two years, the longest period for which any patient has yet been under observation.

Rank and Smith are of the opinion from their experience that the anastomosing procedure is best attempted only on a "defunctioned" bowel. In relation to an elective operation for rectal excision as for cancer they suggest three stages. In the first stage laparotomy is performed, the buried skin tube is constructed and a transverse colostomy opening is instituted. In the second stage, abdomino-perineal excision of the rectum is carried out and the terminal bowel end is anastomosed to the skin tube and buried. Finally, the transverse colostomy opening is closed.

The report is regarded by the authors as preliminary only and they do not consider that the principle should be applied to all cases of colostomy. They feel, however, that it is desirable in the case, for example, of a young person "with the prospect of many years of life, but condemned to an artificial anus". To this everyone will give assent, especially those with colostomy openings.

[1] *Surgery, Gynecology and Obstetrics*, July, 1947.

SURGICAL GLOVE POWDER.

Various workers have, from time to time, drawn attention to harmful effects believed to be due to talc used on surgical gloves. The facts are, however, not widely known or appreciated, and it seems desirable to draw attention to two recent reports on the subject. G. B. S. Roberts, assistant to the professor of pathology in the University of Glasgow, has discussed[1] the pathological findings in seven cases of silicious granuloma all occurring some time after laparotomy. In two cases the lesion developed in the scar in the abdominal wall (an appendicectomy scar in each case) and in five cases granuloma developed in the Fallopian tubes. The scar lesions were moderately painful; the tube granulomata created the clinical effect of a low-grade pelvic inflammation and caused sterility. Silicious particles found in the lesions resembled in size and shape the spicules of talc used by surgeons for dusting gloves. The pathological nature of the lesions is considered to be much the same as that of traumatic silicious granuloma; the mode of arrival of the silica in the area is the contentious point, but there seems little reason to doubt Roberts's conclusion that it was deposited from the surgeons' gloves at the time of operation in the form of talc (talc is a naturally occurring magnesium silicate). The important consideration, as Roberts points out, is that prophylaxis is essential; it does not seem likely that the occlusion of the Fallopian tube can be remedied once it has occurred. A substitute for talc is needed.

Some careful experimental work on various glove powders has been carried out in the United States by C. Marshall Lee and Edwin P. Lehman, of the University of Virginia School of Medicine.[2] Their main concern was with the production of adhesions by talc and comparison of its effect with other powders suitable for use as a substitute. A standard operation was performed on a series of dogs, and the same quantity of each of a series of otherwise suitable dusting powders was scattered as evenly as possible over the bowel and mesenteric surfaces of a respective animal. The quantity was the maximum amount (determined by experiment) which could be expected to be deposited by an operating team of four persons. The powders used were talc, tantalum oxide and three specially prepared corn starch derivatives. All were satisfactory from the point of view of their physical properties, their capacity to be sterilized and their stability under the conditions necessary to their use. The results were striking. In a control animal operated on without the introduction of any powder, no adhesions formed. The introduction of talc produced dense generalized adhesions, a result that was also obtained later with much smaller amounts of talc; macroscopic and microscopic examination revealed the close association of the talc with the adhesions. Tantalum oxide produced equally extensive adhesions. Two of the corn starch derivatives produced a small number of adhesions, and one was completely absorbed from the peritoneal cavity without the production of any local ill-effects whatever; the latter result was confirmed repeatedly. Moreover this non-irritating powder (known as "Starch No. 108" and prepared by a well-known firm) was superior to talc in its flow and dusting qualities, both in the raw condition and after having been autoclaved. Experiments have so far revealed no sensitizing or anaphylactogenic properties of the powder, though this is the subject of further investigations.

In both of these discussions the use of talc is strongly condemned and the grounds of criticism appear sound. It is not known whether "Starch No. 108" as used by Lee and Lehman is commercially available, but it seems clear that the continued use of dry gloves dusted with talc cannot be justified.

[1] *The British Journal of Surgery*, April, 1947.
[2] *Surgery, Gynecology and Obstetrics*, April 15, 1947.

Abstracts from Medical Literature.

SURGERY.

Protein Therapy and Electrolyte Balance.

Harry E. Peters, junior (*The Western Journal of Surgery, Obstetrics and Gynecology*, June, 1947), points out that rational therapy in protein and electrolyte administration does not require any detailed knowledge if the underlying physiological principles are understood and properly applied. Under the heading of acute protein loss he discusses the secondary shock originating from sudden hæmorrhage, a severe burn or extensive trauma. When the body by means of vasoconstriction is unable to reduce the size of the vascular bed, the clinical symptoms and signs of shock occur and a vicious circle is initiated. Capillary dilatation with stagnation of blood, anoxia and increased capillary permeability enhance the loss of plasma from the intravascular to the extravascular spaces. This alters the intracapillary pH, further increasing the loss of plasma. With the loss of plasma and its albumin fraction the intravascular osmotic pressure is increased and this in turn forces more fluid from the vascular bed. The natural consequence is decreased blood volume, diminished return of blood to the heart, and diminished cardiac output; hence anoxæmia, which further augments the capillary physiological process. In the successful combating of shock the diminished blood volume must be restored to normal. Further, since it is known that the shift of the albumin fraction is primarily responsible for the increased extravascular osmotic pressure and the diminished intravascular osmotic pressure, the vicious circle may be reversed best by administering fluid containing the albumin fraction. The author discusses the value of the red blood cell count and of hæmoglobin, hæmatocrit and serum protein estimations, and also the use of rough indices in estimating the plasma requirement, as adjuncts to the clinical evaluation of the patient's condition. Under the heading of chronic protein loss the author briefly reviews the important functions of proteins in the body and then discusses hypoproteinæmia in relation to certain pathological conditions. Chronic hypoproteinæmia must be treated by proteins given by mouth, the normal intake of 60 to 70 grammes per day being increased to 150 grammes per day. In order of decreasing amino acid content, and hence desirability, he lists the proteins of skimmed milk, lean meat, egg, soya bean, wheat and nuts. If sufficient proteins cannot be taken in this manner, it may be necessary to supplement the diet with preparations of amino acids derived from casein hydrolysis. When protein cannot be given by mouth, then use of the parenteral route is necessary. It is possible in some instances to maintain a positive nitrogen balance by using whole blood and plasma. However, in patients with moderately severe chronic hypoproteinæmia, therapy with plasma and whole blood alone presents certain difficulties. The intravenous administration of one of the available amino acid preparations is then indicated. The intake of 100 grammes daily of parenamine or amigens provides a positive nitrogen balance. In discussing fluid and electrolyte balance the author states that sodium chloride is vitally important in maintaining the acid base balance in the body and in exerting the principal control of the osmotic pressure in the extracellular fluids. Five to eight grammes of sodium chloride in twenty-four hours is required by the healthy individual.

Acute Cholecystitis.

L. J. Lester (*Surgery*, May, 1947) states that, in spite of countless investigations and voluminous literature on the subject of acute cholecystitis, there are still blind spots in our knowledge of this condition; clinical reports often present widely different conclusions following apparently similar experiences. He therefore undertook a study of cases in an attempt to correlate in precise terms the clinical features, the operative pathological findings, the post-operative course and the follow-up results. Special attention was given to the incidence of and significance of jaundice and to the management of these cases of acute inflammation of the gall-bladder. The series consisted of 109 cases of acute cholecystitis, the subjects being 72 women and 37 men. The ages ranged from seventeen to seventy-two years for the women and from twenty-five to seventy-two years for the men. A frequent correlation between the severity of the inflammatory process in the gall-bladder and the temperature and white blood cell count was noted. Where the temperature was over 102° F. and the white cell count was over 15,000 per cubic millimetre the gall-bladder was found to be gangrenous in at least one-half of the cases. Cholecystectomy is the procedure of choice for acute cholecystitis, but even when cholecystostomy was performed the majority of the patients remained symptom free without any further surgical treatment. Stones were found in 97% of the acutely inflamed gall-bladders; 20% of the gall-bladders were gangrenous. Gangrene in some cases was due to obstruction of the cystic duct by stone. Gangrene not due to calculus may be due to the necrotizing effect of an activated pancreatic reflux. Of the patients with acute cholecystitis, 17% were jaundiced; the gall-bladder and liver were enlarged more frequently in these patients than in those with simple acute cholecystitis. However, there was no conclusive evidence that hepatitis was a constant accompaniment of cholecystitis. The author considers that the presence of jaundice associated with a dilated common bile duct demands exploration of the duct, because in this series stones were usually found, even if not felt, in such circumstances.

Studies on Human Artificial Insemination.

Abner I. Weisman (*The Western Journal of Surgery, Obstetrics and Gynecology*, June, 1947) reports a series of cases of human artificial insemination commenced in 1937. The donors were mostly selected from the senior classes of the medical school of New York and were selected on a basis of similarity to the individual husband. Ethnic background, colour of hair, eyes and skin, stature, blood types *et cetera* were all considered, and all donors were carefully chosen for intelligence, physical strength, family background, general good health and fertility index. Eighty-seven apparently fertile women whose husbands were sterile were inseminated artificially with donor semen over a period of seven years. Seventy-four of the women became pregnant. As anticipated, follow-ups of the successful cases revealed that the children conceived by this method were physically and mentally as sound as, if not sounder than, children produced by the natural method. The most valuable finding of the follow-up survey was the healthy psychological relationship of the family unit having a child derived through artificial donor insemination. From all indications, as the family grows older, this good relationship should continue.

Absorbable Fibrin Tubes in Vein Anastomosis.

Orvor Swenson and Robert E. Gross (*Surgery*, July, 1947) trace briefly the progress of vascular anastomosis and point out that one of the more recent methods, the employment of vitallium tubes, while satisfactory in some respects, has certain limitations, notably in children, since the metal prevents the vessel from growing with the patient. In their search for a better material or method the authors carried out experiments with fibrin tubes. These are constructed from sheets of fibrin film, made by plasticizing fibrin with water. The resultant film is rolled around a glass rod of the desired diameter until a tube with a wall of half to one millimetre in thickness results. This tube is left on the rod and sterilized by steam. It can then be slipped off the tube and kept indefinitely in a sterile container. Before use the fibrin tube is placed in normal saline solution for about ten minutes. Dogs were used for all the experiments, and the *vena cava* or the jugular veins were used for the anastomoses. When examined later the intima was smooth and glistening and the suture line difficult to identify. No thrombosis had occurred. It was found that the fibrin cuffs disappeared in about six weeks. The authors conclude that the method produces an anastomosis of adequate size, not constricted by a metallic ring, and able to enlarge in diameter with any subsequent growth of the patient.

Gastric Neurectomy for Gastric and Duodenal Ulceration.

Waltman Walters, William F. Bradley, Harold A. Neibling, John T. Small and James W. Wilson (*Annals of Surgery*, July, 1947), prompted by Dragstedt's work, studied the problem of resection of the vagus nerve from the anatomical, clinical and experimental standpoint. The distribution of the vagus nerves, above and below the diaphragm, was studied in 100 cases at necropsy and the results in 66 cases of resections of the vagus or gastric nerves carried out at the Mayo Clinic in the treatment of peptic ulcer were studied. The authors regard this report as only interim and consider that the final report on this operation will not be due for some years. In the meantime the procedure can be used in four groups. First, in cases of recurring ulcer, after an adequate gastric resection, when it appears justifiable to undertake the comparatively simple operation of gastric neurectomy on the chance that the ulcer will heal and symptoms will be relieved. Second, in

certain cases of gastric ulcer in which excision of the ulcerating lesion is necessary to exclude the possibility that it is malignant. Third, in certain cases of obstructing duodenal ulcers associated with a high gastric acidity when simultaneous gastro-enterostomy is performed to relieve the duodenal obstruction. Fourth, in chronic, non-obstructing duodenal ulcer when the cephalic phase of the hyperacidity seems to overshadow the other factors and no response has been obtained from repeated courses of medical treatment. The anatomical study revealed that in 92% of the cases the vagus nerves pass through the diaphragm as two distinct trunks and are readily accessible for resection. This leads the authors to favour the transabdominal approach, when exploration of the abdominal contents, and especially of the ulcer, can be carried out. Any other operation on the stomach and the duodenum can then be combined with the resection of the vagus nerves. The authors state that the immediate results, as evidenced by reduction in gastric acidity, gastric secretion, relief of gastrospasm and relief from pain, have been good but not striking. If the good results persist, the operation offers an easy and comparatively safe method of treating certain cases of peptic ulcer.

Multiple Retrograde Saphenous Vein Ligation and Phlebectomy with Malleable Intraluminal Guide.

ARKELL M. VAUGHAN (*Surgery*, June, 1947) states that in his opinion high saphenous vein ligation combined with multiple retrograde ligations and excision of segments of the vein is superior to high ligation *plus* retrograde injection of a sclerosing solution. To locate the saphenous vein above the knee he inserts a malleable intraluminal guide, such as a flexible, medium-sized uterine probe, into the lumen of the vein near the *fossa ovalis* area and passes it downward. This procedure can be repeated down the course of the vein above and below the knee. The author describes his technique in detail and states that, while recurrences may and do follow this procedure, they are not so frequent as when retrograde injection is used.

Aneurysm of Abdominal Aorta.

G. DE TAKATS AND J. T. REYNOLDS (*Surgery*, April, 1947) discuss the surgical treatment of aneurysm of the abdominal aorta and describe their experiences with eight cases. In six of these the aneurysms were operated upon and in three "Cellophane" was used. The authors point out that sudden obliteration of the aorta carries the double risk of not allowing time for the establishment of a collateral circulation and of throwing a strain on the circulatory mechanism. "Cellophane" has the advantage of stimulating a gradual fibrosis, and the authors, in addition to trying it as a proximal ligature, also recommend covering the surface of the aneurysm with the material in order further to favour thrombosis. All materials used to obliterate the aorta by pressure carry the risk of causing a pressure necrosis of the vessel wall with consequent fatal hæmorrhage. The authors consider that there are three practical methods of treatment for abdominal aortic aneurysm. First, the production of slow fibrosis by the non-constricting application of "Cellophane", followed later by the introduction of wire into the cavity. Second, excision of the sac—an heroic procedure, but safer from the point of view of ultimate proximal rupture of the vessel. Third, a combination of proximal banding with a partial "Cellophane" wrap around the sac—a method used in one of the cases reported. The greatest care must be exercised to see that the "Cellophane" does not come into contact with the peritoneal cavity, owing to the risk of causing adhesions and intestinal obstruction. The authors point out that the type of "Cellophane" used is of great importance, and quote the work of Poppe and de Olivium, published in *The Journal of Thoracic Surgery*, Volume XV, 1946, page 186. The last workers advocate the use of "Polythene Cellophane".

Tissue Reaction to Oxidized Cellulose.

F. J. BURNS (*Archives of Surgery*, September, 1946) implanted samples of oxidized cellulose in the peritoneal cavities of dogs under aseptic conditions and studied the mechanism of absorption. The cellulose (which may be used as packing to control bleeding and be left *in situ*) was oxidized by the action of nitrogen dioxide and then washed with distilled water and air dried. This material can be sterilized by boiling for three minutes, or in formaldehyde, but cannot be autoclaved, as it disintegrates. Pieces of this material were introduced into the peritoneal cavities of dogs, the cavities being reopened for inspection after varying periods. Sections from neighbouring tissues were examined histologically. Macroscopically the gauze was found to form a gelatinous, brownish mass, which gradually decreased in size until completely absorbed. Microscopically at first a moderately acute inflammatory reaction could be seen, with many neutrophile cells, followed later by macrophages. Burns concludes that oxidized cellulose is completely absorbed from the peritoneal cavity of the dog in about twenty-eight days. In some cases fibrinous adhesions form during absorption, but when absorption is complete there is no visible trace of the gauze. The rate of absorption depends on the amount of gauze implanted.

Anal Ileostomy after Total Colectomy.

M. M. RAVITCH AND D. C. SARISTON, JUNIOR (*Surgery, Gynecology and Obstetrics*, June, 1947), discuss the problem of patients who have to submit to a total colectomy for benign lesions, and report the result of some animal experiments. Total colectomy is usually performed for one of two indications: familial multiple polyposis and non-specific ulcerative colitis. In the former condition the risk of malignant change is the factor which makes radical surgery necessary. Various series have shown the high incidence of carcinoma of the colon in patients with polyposis. In the main, two operative procedures have been used. Firstly, a total colectomy may be performed, with a permanent abdominal ileostomy opening. Secondly, all polypi visible through a sigmoidoscope may be destroyed by diathermy and the ileum anastomosed to the terminal portion of large bowel and rectum which has thus been freed from polypi. This second method preserves the use of the anus, but exposes the patient to the risk of carcinoma in the residual large bowel. The authors report such a case and refer to others. They conclude that the only safe operation is one which removes all the affected epithelium. In an endeavour to devise a method which would achieve this without losing the use of the anus and its sphincter, the authors performed total colectomy on a number of dogs. A circular incision was made at the muco-cutaneous junction and the anal mucosa dissected out and removed with the rectum and large bowel. The terminal ileum was then mobilized and sutured to the skin edge. The anatomical result is said to have been indistinguishable from normal. The dogs passed frequent motions, changing from liquid to soft as time passed. Good sphincter tone returned, and defæcation was apparently voluntary and more or less deliberate. Perianal excoriation was extensive for some weeks, gradually healing entirely. The authors consider that this operation is worthy of consideration in human patients as a means of avoiding a permanent ileostomy opening after total colectomy.

Oxygen Injection in Spreading Gas Gangrene.

D. HINTON (*American Journal of Surgery*, February, 1947) discusses the use of injections of oxygen into the tissues to arrest spreading gas gangrene infection. A case is reported in which gas gangrene due to *Clostridium welchii* followed a compound forearm fracture. Despite timely orthodox treatment, including antiserum, "sulpha" drugs, penicillin, and amputation, the infection spread to the chest wall and the patient's condition became desperate. Through each of seven points just ahead of the advancing edge an injection was made of a litre of oxygen. These injections were repeated several times. It is stated that a strikingly favourable effect was observed. A special machine was used by means of which the oxygen pressure could be limited to 120 millimetres of mercury. The author used the method in two other cases with satisfactory results.

Pulmonary Resection for Solitary Metastatic Sarcomata and Carcinomata.

JOHN ALEXANDER AND CAMERON HAIGHT (*Surgery, Gynecology and Obstetrics*, August, 1947) review the notes of twenty-four cases in which resection of a metastatic pulmonary lesion has been performed. The appearance of a presumed solitary metastatic lesion in the lung months or years after the apparently complete removal of a primary extrapulmonary sarcoma or carcinoma is far from rare. If untreated surgically, these patients die from invasive, infectious or pressure effects of the original metastatic lesion or from other metastases. An operation to remove such a metastatic malignant neoplasm is obviously a gamble, but as there is some chance of success, and as failure to remove the lesion surgically will result in the death of the patient, the operation needs no further justification. One of the twenty-four patients died as a direct result of operation. Eleven have had recurrence of the neoplasm and twelve have had no recurrence. Among the twelve patients with no recurrence, eight are apparently well, twelve, seven, six, five, four, three, one and a quarter, and one year after the pulmonary resection operations. Four patients were operated on too recently for evaluation.

Congresses.

THE AUSTRALIAN AND NEW ZEALAND ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE twenty-sixth meeting of the Australian and New Zealand Association for the Advancement of Science was held in Perth from August 20 to 27, 1947, under the presidency of Dr. A. E. V. Richardson, chief executive officer of the Council for Scientific and Industrial Research.

The Sections.

The sections represented were: *A*, Astronomy, Mathematics, Physics and Optometry; *B*, Chemistry; *C*, Geology; *D*, Zoology; *E*, History; *F*, Anthropology and Speech Sciences; *G*, Economics, Statistics and Social Science; *H*, Engineering and Architecture; *I*, Medical Science and National Health; *J*, Education, Psychology and Philosophy; *K*, Agriculture and Forestry; *L*, Veterinary Science; *M*, Botany; *N*, Physiology; *O*, Pharmaceutical Science; *P*, Geography and Oceanography.

General Council Meeting.

At a general council meeting held on August 20, 1947, the association accepted an invitation from the Premier of Tasmania to hold its next meeting in Hobart in January, 1949.

Dr. A. B. Walkom, director of the Australian Museum in Sydney, resigned from the position of honorary general secretary. The council recorded its appreciation of the great services rendered by Dr. Walkom during his twenty-one years of office. Professor W. A. Burges, of the University of Sydney, was elected honorary general secretary in place of Dr. Walkom, and Professor J. R. A. McMillan, of the University of Sydney, was reelected honorary treasurer. Dr. A. B. Walkom was chosen as president-elect for the next meeting of the association.

As the Mueller Medal regulations provided that an award should be made "not more frequently than every second year", no award was made this year.

The honorary secretary's report stated that at June 30, 1947, there were 208 Fellows and 223 Annual Members. An invitation had been received from the British Association to be represented at the first full post-war meeting commencing on August 27, 1947, at Dundee. Professor R. D. Watt, of the University of Sydney, had agreed to represent the Australian Association.

Receptions.

The presidential reception was held in the university grounds on the afternoon of Wednesday, August 20. Before the arrival of the Lieutenant-Governor (Sir James Mitchell) and Lady Mitchell, a massed band of pipers paraded through the grounds and greeted the vice-regal party with the Lochleven salute. Guests were received by the president of the congress (Dr. A. E. V. Richardson) and Mrs. Richardson and by the honorary secretary (Dr. A. B. Walkom) and Mrs. Walkom.

The Western Australian State Government entertained section leaders and State secretaries of the association at a luncheon on August 25, and on August 20 the Lord Mayor, Mr. J. Totterdell, gave a civic reception to the general officers of the congress, presidents and secretaries of sections and a number of special delegates.

On Tuesday, August 26, members of the association were the guests of the Senate of the University of Western Australia at an evening reception in the Winthrop Hall. During the evening the honorary degree of doctor of science was conferred on Dr. A. E. V. Richardson (president of the association and chief executive officer of the Council for Scientific and Industrial Research), on Sir John Madsen (chairman of the Radio Research Board), and on Sir Theodore Rigg (director of the Cawthron Institute, Nelson, New Zealand). Professor Walter Murdoch, Chancellor of the University of Western Australia, presided at the ceremony and gave a short address, welcoming the three graduates and assuring them that he would watch their future careers with interest.

Lyle Medal.

Awards of the Thomas Ranken Lyle Medal to John Conrad Jaeger, D.Sc., M.A., F.Inst.P. (lecturer in mathematics at the University of Tasmania), and to David Forbes Martyn, D.Sc., Ph.D., J.Inst.P. (Council for Scientific and Industrial Research) for their researches in mathematics and physics, were announced by the president of the Australian National Research Council, Sir John Madsen.

Masson Lecture.

The Masson Lecture was given on August 19 in the Winthrop Hall of the university by Dr. R. V. de R. Woolley, director of the Commonwealth Solar Observatory, Canberra. Taking as his subject "The Solar Corona", Dr. Woolley explained that this extension of the sun's atmosphere, seen only at times of total eclipse, had offered many serious problems in science which were gradually being solved by recent research. It was now thought that the light from the corona was sunlight scattered by electrons and by dust particles. Why such dust did not evaporate in the great heat of the sun had been explained by Dr. Allen by supposing that the dust was distributed between the sun and the earth. It was this same dust that gave the zodiacal light visible after sunset at that time of the year in the western sky. Well-established observations indicated that the temperature in the corona was of the order of 1,000,000° C.

A further difficulty that had presented itself was the presence in the spectrum of the corona of lines not observed in the laboratory. At one time these had been attributed to a hypothetical element named coronium. Recent work by Swedish physicists, published during the war, had indicated that coronium was a mixture of common elements, including iron, in a peculiar condition in which the atoms were stripped of their outer electrons. Dr. Woolley showed that this was consistent with the high temperature now known to obtain in the corona. He added that it was an example of the way in which astrophysics could sometimes supplement laboratory physics. These stripped atoms could not be produced in the laboratory, and the idea of their existence would be only theoretical speculation but for observations of the corona. The lecturer discussed the effect of radiation from the corona on long-distance radio communication, and said that calculations showed that it was probably not so effective as the rest of the sun in forming those electrified layers in the earth's atmosphere which made long-distance radio communication possible.

Dr. Woolley went on to say that the corona had also acquired new interest as being a source of solar noise. When radar sets were directed towards the sun, signals could be detected which appeared as noise in headphones attached to the radar set. Dr. D. F. Martyn, of the Council for Scientific and Industrial Research, had shown that any radiation of about 200 megacycles' frequency or less originated in the corona. The noise was variable in intensity and bursts of noise were observed when the sun was in a disturbed condition. There was also a continuous background of noise, which was consistent with the estimated high temperature of the corona. In conclusion, Dr. Woolley said that the corona had long been the most puzzling portion of the sun; but its nature was gradually being ascertained and the problem of its high temperature was now the only one which presented any serious difficulty. The lecture was illustrated by lantern slides showing photographs of the solar corona.

Film Evening.

On Sunday, August 24, at 8.45 p.m., there was an exhibition of films of scientific interest: "The Karri Forests of the South-West", "Wild Flowers of Western Australia", "The Abrolhos Islands" and "Testing Einstein's Theory at the 1922 Solar Eclipse Expedition, Wallal, Western Australia".

Excursions.

Ideal weather favoured the many excursions planned by the Western Australian Committee of the congress. Parties visited Rockingham, Mandurah, Wungong Gorge, National Park, Mundaring and Yanchep, while others, going farther afield, were taken to the Watheroo Magnetic Observatory, the Avondale Research Station, Harvey irrigation area, Stirling Dam and Lake Campion. Members of Section *K* visited Dwellingup Forest, and a large party under the leadership of Professor F. Alexander (Section *E*) visited the Benedictine mission and monastery at New Norcia. Many delegates took part in longer, post-sessional excursions to Manjimup and the south-west, to the Irwin River and the Abrolhos Islands and to the sand plain country to the north of Geraldton.

Scientific Institutes.

Members of Section *L* visited the Animal Health and Nutrition Laboratory, Hollywood, and members of Section *K* inspected the Institute of Agriculture at the university. Visits to the Perth Observatory were arranged for members of Section *A*.

Inaugural Meeting and Presidential Address.

The inaugural meeting was held in the Winthrop Hall of the university on the evening of Wednesday, August 20, when the newly elected president, Dr. A. E. V. Richardson, delivered his address on "Science in Relation to Australian Development". He expressed his thanks to the Government of Western Australia for the generous financial assistance to the congress and to the University of Western Australia for the privilege of using its beautiful hall. One of the purposes of the association was to make the general public familiar with the advancement of science and to show the patient work from which it sprang.

Dr. Richardson said that Australia was a vast country, inhabited by only 7,500,000 people. Attention to the contrast between eastern and western modes of life was focused on this continent, whose extensive resources were enjoyed by so few people. If the Australian people wished to maintain a permanent title to this continent, they must demonstrate to the world practical achievement in the development of its resources. Dr. Richardson proceeded to describe, firstly, the natural resources of Australia and, secondly, the extent to which they had been developed. There was a common belief among other nations that Australia had vast spaces capable of supporting a population many times greater than the present. The broad facts were that apart from a fertile east coast, a partly fertile south coast, and a fertile south-western belt, more than three-quarters of the continent could carry only a relatively sparse pastoral population. If the possible effect of new major discoveries of minerals or of oil was excluded, 34% of the continent was mainly true desert and uninhabitable, 42% was likely to remain sparsely populated pastoral country, and only 24% or approximately 464,000,000 acres received a rainfall adequate for agriculture and intensive stock-raising. The absorptive capacity for agricultural settlers must be measured by the possibilities of closer settlement in this region. Only a third, or 144,000,000 acres, in the well-watered region was likely to be brought under cultivation; the remaining two-thirds were unsuitable owing to poverty of soil, rugged mountains or other factors. Of this acreage, a quarter to a third would be available each year; the rest might lie fallow in rotation. This brought the yearly crop acreage to 36,000,000 to 48,000,000 acres *per annum*—rather more than double the acreage of the last few years. Future research might alter this; even under present conditions, substantial areas in the favoured portion were still virgin soil. Moreover, better farming methods would greatly increase output, apart from any extension of the area under cultivation.

Water conservation was an important part of national policy. It was unlikely that irrigation schemes could water more than 5,000,000 acres. The artesian basin, however, was the largest in the world, and vast developments of hydro-electric power were possible in New Guinea and in Tasmania.

Soil surveys were still inadequate. The higher the rainfall, the less the resources of the soil. Many of the soils of the well-watered coastal districts were of the "podsol" type—an ashy-grey, highly leached surface soil over a yellow clay subsoil. On the other hand, in the desert the scanty rainfall was insufficient to leach the soluble salts. Between these two extremes Australia showed a very interesting series of soils. A further feature of Australia was that the greatest regions of soil deposition were too arid for use, and therefore not comparable with the basins of the Ganges, the Yangtse and the Mississippi.

To ensure that the agricultural industry should attain a high degree of efficiency it was necessary that farmers should have available to them the benefits of modern research and knowledge of the most modern methods. This meant the maintenance of a vigorous policy of research into farming problems and the provision of an adequate extension service which would provide the farmer with the necessary technical advice.

A significant feature of recent research work was the demonstration of the role of the minor elements or trace elements, such as copper, manganese, zinc and molybdenum, in the nutrition of plants. This work was of great scientific interest and of considerable economic importance.

Dr. Richardson went on to say that Australia was abundantly provided with hardwoods for constructional purposes and cabinet woods of great variety; but it required soft-woods and woods for special purposes, much of which could be provided by the planting of exotic conifers and by reafforestation of valuable indigenous softwoods. The jarrah and karri forests of Western Australia were among the few forests of the British Commonwealth which were managed on the basis of a sustained annual yield and in which regeneration kept ahead of exploitation.

Dr. Richardson considered that present methods of conservation and utilization of timber were very wasteful. Of the fallen tree, less than 20% was ultimately utilized. Much of this waste timber could be used as raw material for a wide range of useful products, including pulp products and building boards. Recent developments in timber research, especially those relating to plastic impregnated timbers, had given every species of timber a new value.

Speaking of the fishery resources of the Commonwealth, Dr. Richardson said that these had not as yet been adequately explored. Material increases in production would result from the extension of trawling, from the development of an industry based on pelagic species such as tuna, mackerel and pilchards, which had been proved to be abundant in Australian waters, from exploration in cold waters to the south of Australia, and from the development of whaling activities in the Antarctic.

With regard to mineral resources, Dr. Richardson said that Australia was well supplied with coal of all types in New South Wales and Queensland; but black coal was limited in Victoria, Western Australia and Tasmania, and there was none in South Australia. Black coal reserves so far disclosed amounted to 14,280,000,000 tons, while brown coal reserves of Victoria were estimated at 37,000,000,000 tons. These were adequate for a very substantial expansion in secondary industry. Australia's iron resources were more than adequate for domestic requirements for a long period. Australia was in a fortunate position in regard to lead and zinc and tungsten, and was fairly well endowed with most metallic and non-metallic minerals, though she was dependent on outside sources for petroleum, phosphate and potash.

A critical survey of the natural resources of Australia—land, water supply, soil, forests, fisheries, minerals—indicated that while the natural resources were not illimitable, they were still fairly substantial and formed a goodly heritage, the right to which was effective occupation. Erosion and siltation, so common today, testified to man's wastefulness. Reafforestation could be made to provide better forests than the natural ones. The natural resources were indeed sufficient to provide for a material expansion of the primary industries and for a greatly expanded secondary industry.

Dr. Richardson then asked how Australia was to obtain the population necessary for her development and for her security. He said that a rapid increase in the natural growth rate was unlikely. The natural increase must therefore be reinforced by a vigorous migration policy. This involved the creation of circumstances that would lead to a rapid development of industry. Primary industries could be expanded; two-thirds of the people of the world were perpetually underfed. However, these industries were not likely to absorb large numbers of migrants because of the growing trend of mechanization and of modern scientific developments, both of which tended to reduce the numbers required on the farm.

Efforts to promote migration based on land settlement had been disappointing, and in 1938 there occurred a marked change in the policy of the governments of the United Kingdom and Australia. Both countries had agreed that in the interests of the British Empire as a whole it was desirable for Australia to bring about as soon as possible a substantial increase in her population. Since it was impossible to achieve this object solely or principally by an expansion of primary industries, it had been agreed that there was a necessity to combine with such expansion a sound and progressive development of the secondary industries.

The first World War had forced Australia to manufacture many new commodities previously imported and had stimulated industrial development. The second World War had further stimulated the expansion of manufacturing and had led to the development of heavy and precision industries and to the manufacture of a wide range of industrial products which required mass-production methods. The manufacturing industries were now far more important than the primary industries in the Australian economy, from the points of view both of numbers employed and of volume of output, and future absorptive capacity would lie in the secondary and tertiary industries rather than in the primary industries. Therefore, if Australia was to add greatly to the numbers of migrants, she must actively develop the secondary industries. The essentials for these were cheap power, abundance of raw materials, and scientific and technical personnel.

The production of power at a cheap rate was the first essential. With power available cheaply and abundantly, a country could think boldly in terms of success in a variety of industries, such as the cluster of industries related to power production, steel, metals and their fabrication, and all basic chemical industries. Though Australia had abundant coal supplies, the actual supply of black coal had fallen far short of demand, and States other than New South Wales and Queensland had been forced to rely on domestic

fuels, such, for example, as the brown coals of Victoria and the lignites of South Australia. Dr. Richardson pointed out that the really big problem was how to get better extraction of coal from the mine. The factors involved were mechanical and human—to get coal out with the greatest degree of efficiency and to make the industry attractive to the workers, for no democracy in normal times could direct any section of the community to spend its life in mines against its will.

The enormous brown-coal deposits of Victoria could be worked with open-cut methods and would play an increasingly important part in the production of cheap power. But apart from coal, there were the undeveloped hydro-electric resources with a potential of 4,000,000 horsepower in Tasmania and the Eastern States, and the vast hydro-electric potential in New Guinea.

Raw materials from the agricultural and pastoral industries were available in abundance, as Australia consumed only one-half of its total agricultural and pastoral products. Raw materials of the forest were adequate, except at present for softwoods for industrial purposes. Iron resources were sufficient for a greatly expanded steel industry, and in metals and non-metallic minerals, with a few exceptions, the resources were adequate for the country's needs.

Dr. Richardson considered that the responsibility for providing for the investigation of scientific and technical problems associated with industry must rest largely with the nation, but also to a considerable degree with industry itself. The universities, as the traditional centres for scientific research and for the training of scientists and technologists, must transmit and advance knowledge, and, to perform their dual role of advancing the frontiers of knowledge and training research workers, they would need to be supported liberally. They could not discharge their great responsibilities unless they were given adequate financial assistance to secure the highly trained staff and the facilities and equipment needed to meet modern demands in the physical, biological and social sciences. The growing importance of science in relation to defence needs served to emphasize the necessity for strengthening the universities.

Dr. Richardson thought that the social sciences had a vital part to play in the social reconstruction which was proving necessary in every country, and were of the greatest importance to national welfare. In order to reap the full benefits of science there should be an intimate relation between science and social progress at every stage. In many ways the present was the most interesting epoch man had ever witnessed. The pace of modern progress in science had been so rapid that social and political developments had lagged, particularly in keeping guard over the results of the applications of science to see that they did not turn in unforeseen and undesirable directions. Man's greatest danger came from his own warring passions. Dr. Richardson concluded that one of the most urgent needs of the present day was to prevent the latest scientific discovery of the release of atomic energy, so rich in promise of good, from unlocking instead the door to disaster. The ability to release atomic energy gave mankind great new powers, which might be used for good or for ill. Provided means could be found whereby atomic energy was used only for peaceful purposes, this new discovery might well prove to be the supreme gift of science to humanity.

The Labour Problem in Australian Farm Industries.

On Thursday, August 21, Professor S. M. Wadham (Melbourne) gave a lecture on "The Labour Problem in Australian Farm Industries". He said that this subject was unpopular in some quarters, but the problem was urgent. The availability of farm labour was important if one accepted the view that most types of farming were more efficient when carried out on farms large enough to employ two or more men. The nation had accepted the principle of full employment—namely, that every man willing to work would be found a job at a reasonable wage. National projects involving considerable employment would be inaugurated as soon as unemployment seemed likely. What chance would an agriculture without a wage system have of attracting men to its work when a steady alternative was available? Rural wages had been fixed for some farm industries during the war, and it was not clear whether official fixation would be retained in the post-war period. Prices of products had been raised to enable farmers to meet these wages; but it was not clear how long this would last. Naturally there was some hesitancy among farmers in agreeing to wage fixation. Professor Wadham hoped that it was unthinkable that under peace-time conditions an Australian government should pass legislation directing people to work on farms if they were not prepared to do so of their own free will, and even if in any emergency such legislation was practicable, wages would have to be fixed.

Professor Wadham was not advocating wage fixation, but merely pointing out that it must inevitably occur. The problem was not one which could be faced solely on the basis of wages regulation. Rural housing and other amenities might be as significant as wages in holding efficient workers. On many farms conditions for cooking, washing, bathing, and storing food were still of a primitive order. The gap between the amenities of the average suburban house and those of the average farm had widened in the last twenty years. Efficient labour could not be maintained on farms unless that gap was decreased. The matter was probably particularly important in the north of Australia, where, during some months of the year, conditions were often arduous in the extreme. Unless more attention could be paid to the design of houses and to effective study of the ways of living in this climate, all efforts to populate or render productive this section of the continent would assuredly fail.

Professor Wadham went on to say that the regulation of agricultural wages by normal methods might be distasteful to farmers. Nevertheless, if his view was correct, some movement in this direction was essential if the industry was to be effectively manned. Farm industries themselves might investigate the matter in their own interests. At present their chief objective was usually in the direction of increasing the prices of the commodities which they produced. Their claims would be even stronger if they could demonstrate a clear relationship between wages paid and, firstly, efficiency of production, secondly, the cost structure of that production and, finally, the wages they were paying. Similarly, there was no reason why farmers' organizations should not make the improvement of rural housing and amenities a main objective. British farmers had been assisted for the last fifteen years. In Denmark and other European countries the State had assisted in the erection of modern houses on farms and in the improvement of farm housing standards. In many other directions one felt that groups of farmers in districts by ready cooperation could arrange for the provision of many more amenities than they at present possessed. No amount of assistance would, of course, ever make life on the land precisely the same as life in the city. The conditions of life and of work were different. Those who found the periodic tribulation of mud or a dust-storm unbearable must live in the cities. On the other hand, to many the worth of a relative freedom to plan one's day, the absence of jostling crowds and relief from packed trams and trains could not be measured in monetary terms of so many shillings per week. Professor Wadham knew that many Australians valued the country life far more highly than that of the city, just as there were others to whom the abhorrence of solitude and the worship of "over-civilization", so to speak, made country life most distasteful. The important thing was that each should, as far as possible, be able to live under the conditions which he or she desired. Wages and the capacity to produce must be a moderating factor. Few human beings, however philosophical, were as easily satisfied as Diogenes.

Symposium on Atomic Energy.

On the evening of Monday, August 25, a symposium on the subject of "Atomic Energy" was held in the Winthrop Hall of the University of Western Australia. The speakers were Sir Kerr Grant, professor of physics in the University of Adelaide, Sir Stanton Hicks, professor of human physiology in the University of Adelaide, and Professor G. V. Portus, professor of political science and history in the University of Adelaide.

Atomic Energy and the Future.

Sir Kerr Grant gave a résumé of the basic researches on nuclear fission and chain reactions, and explained how at the present time the energy of certain atomic nuclei could be employed either explosively in the atomic bomb or under control in the atomic "pile". He said that the economics of atomic energy—the cost of the raw materials and the cost of operation of the "pile" and of accessory operations—had still to be ascertained. Probably large "piles" giving 100,000 kilowatts or more would be found profitable and would be in operation in a period variously estimated at from five to fifty years.

The immense military significance of the atomic bomb still dominated United States policy. Thus the chairman of the United States Atomic Energy Commission had recently declared that until there was international accord on this problem and international safeguards satisfactory to the nations of the world had been set up, the purpose of the commission was to maintain and indeed to increase the pre-eminence of the United States in the field of development of atomic energy and atomic weapons. Sir Kerr Grant said that that was an exceedingly frank declaration and should

leave a nation bent on aggression in no doubt as to what would happen if it should engage in war with the United States of America.

There was one feature of this military significance and the policy associated with it which carried an unfortunate and even a sinister implication, of special interest to the congress and to the future of science generally. This was the requirement of secrecy imposed upon the results of scientific work which might possess military value. While the possibility of war remained, and of course in the eventuality of war, it was difficult in the former case, impossible in the latter, to oppose or to deny the necessity for such a requirement. On the other hand, it was a requirement which stood in flagrant opposition to that spirit of free inquiry and full publicity which was the very life-blood of scientific work—a spirit responsible not only for the immense benefits which science had bestowed on humanity at large, but even paradoxically for the very weapons to which those present, with their allies, owed their preservation from a fate of conquest or servitude.

Sir Kerr Grant went on to say that he had a faith that went beyond that expressed by the president in his inspiring address from the presidential chair, when he expressed the hope that this new accretion to the material power on which civilization rested would find its application to the purposes of peace and prosperity rather than to that of war and destruction. When one looked backward down the long vistas of the past, one saw that the upward struggle towards a better life had been maintained—even though painfully and often at the price of much human sacrifice and suffering—despite the fact that every agency and every device that human ingenuity had devised had been employed both for and against the cause of human betterment and human brotherhood. So would it surely be when the future looked back to the day on which science revealed to mankind this new and tremendous instrument of power.

Atomic Energy and the Physiologist.

Sir Stanton Hicks said that there were two aspects of the development of the nuclear fission pile which had significance for the physiologist. These were the ready availability of a wide range of isotopes, both stable and unstable, and the large-scale production of penetrating X radiation, either from radioactive isotopes or during the liberation of atomic energy for peace-time or war-time use.

The epoch-making physiological researches of Rudolf Schoenheimer had been greatly accelerated by the large-scale production of isotopes in the course of nuclear fission research, which today brought into commercial production isotopes invaluable for the prosecution of investigations into the chemical combinations involved in the processes of assimilation and metabolism which lay at the basis of the mechanism of life, whether plant or animal. Even in such a complex living system of fungi, bacteria and actinomycetes as existed in the top soil, this new weapon of research was establishing vital forms of interdependence between the microorganisms present. The technique depended upon the fact that an isotope of an element, whilst having chemical properties identical with those of the "normal" element, and therefore partaking in all its movements within the living cell or organism, could be readily identified by its atomic number, much as different labels on identical makes of luggage served the same purpose. This enabled the investigator to follow the changes involving a "labelled" carbon, nitrogen or hydrogen atom, or an organic compound or chemical group having special significance in building up the protoplasm of a cell, or depositing fat, or providing energy.

The singular fact that had emerged from these researches was that within the body there was no difference between molecules and groups which were involved, as had previously been believed, in the production of energy, and those involved in "building" cellular structures. Cell molecules and chemical groups were involved in a dynamic *mêlée* in which the building and breakdown of vital material like protoplasm took place continuously. The conception of a fixed protoplasmic structure, which merely underwent replacement of "wear and tear", disappeared and an entirely new basis for the understanding of nutrition and of the action of drugs, hormones and vitamins could be said to have emerged. If radioactive isotopes were used, the rate of the arrival of the element involved in special body functions could be estimated by means of the electron counter. Thus the rate of arrival and concentration of iodine in the thyreoid gland or of phosphorus in a tooth could be investigated, or the movement of thiamin. The fact that the radioactive isotope of phosphorus arrived rapidly in the solid structures of the living tooth brought the vexed problem of tooth structure and decay very much nearer solution. The use of radioactive isotopes had been successfully applied in the treatment of morbid cell growths, such as polycythæmia and myeloid leuchæmia, and even in treatment of liver carcinoma promising results had been obtained.

The use of the atom bomb, with its blast of penetrating X radiations, had aroused interest and even alarm, and the possible effects of the exposure to these rays of the sex cells of human beings were being investigated. This influence was first demonstrated by Muller in 1927, and as recently as 1947 it had been reported that a mathematical relation had been established between the amount of radiation energy applied and the number of mutations produced in the sex cells of the banana fly, which had been used in these researches. The fact that a strict mathematical relation could be established pointed to the possibility of a much simpler chemical structure of the gene or bearer of hereditary characters. Moreover, the nature of possible results of X radiation of sex cells was becoming increasingly clear. When the mutation was such as to affect the genes in the cells of only one of the two sexes, it had been found possible to destroy beforehand the possibility of any males resulting from the union of the parents.

Atomic Energy in the Economic and Political Fields.

Professor G. V. Portus said that if the Winthrop Hall was a cathedral (as it very well might be), and if he was about to preach a sermon, he would take his text from the Epistle of Truman to the United States Congress, dated October 3, 1945: "The release of atomic energy constitutes a new force, too revolutionary to consider in the framework of old ideas." Professor Portus proceeded to indicate certain of these old ideas, in two fields—the economic and the political.

In the economic field the immediate effect must be an enormous start forward in productivity. In the prevailing social temper of modern States, this would surely point to a progressive decrease in the hours of labour, which would mean more leisure all round. How was that leisure to be occupied? The prospect of watching an unending series of test matches and other gladiatorial displays was not very inviting; nor was the anticipation of continuous attendance at non-stop cinemas, for custom would stale the appeal of such spectatorship for all but the morons. What active occupation should be given to the emancipated in the longer hours between knocking off and bedtime? To Professor Portus the obvious answer was adult education. Of course, the concept of adult education must be spacious. It must include music, travel, hobbies, concerts—the arts and crafts that gave men and women a creative outlet. It must be freed from the control of academic mandarins and made as self-governing as possible; and the horrible attitude that such education was a gesture to the under-privileged must be abandoned. In a world of vastly increased productivity adult education must be a right for all citizens, just as much as parks and gardens and swimming pools and hospitals.

Professor Portus warned those present that, while this was a benign enough prospect, all implications of the application of atomic energy were not so roseate. Every advance in man's control over Nature had its repercussions. The fruit of the tree of knowledge was always driving man from some paradise or other. Groups which functioned under the old order would not fit snugly under the new. Those who had made large investments in the production of commodities would see these vested interests threatened. It had been said that this would occur only in a capitalist economy. Professor Portus was not so sure of this. He could well imagine the director of some huge enterprise in a socialized community resenting very much indeed changes in the technique of production which would by-pass his particular plant and leave his particular technique outmoded. Then there were the workers. If the released atomic energy from one pound of uranium 235 would equal that now obtained from the burning of a thousand tons of coal, what would happen to the coal industry and the coal miners?

The solution of these problems would take years of complicated adjustment and patience and good temper, and if men were not prepared to have patience and good temper, then social turmoil and revolution would surely follow in the wake of this new force, "too revolutionary to consider in the framework of old ideas".

Turning to some of the political implications of atomic energy, Professor Portus referred to the current controversy among the United Nations about the international control of atomic weapons. The United States wanted a definite decision about an efficient agency of control before it scrapped its stock pile. Russia wanted to have the pile scrapped and then discuss the control plan. That was where international control stood at present. Professor Portus said emphatically that he for one did not believe that an atomic war would wipe out civilization. He did not deny

that such a war would mean suffering and death for millions upon millions of men and women, that it would destroy cities and blacken whole countrysides, that it would be followed by dreadful diseases and eras of poverty and misery for the survivors. But even all that would not wipe out civilization merely by wrecking its material fabric and causing widespread death.

The most rational way of escape from the threat would be to place atomic energy under international inspection and control. But the lion in the path of international control was the national sovereign State. . Nationalism was not patriotism. Patriotism should be based on those aspects of culture which had a universal appeal, such as music, art, architecture, science. In that way they could preserve whatever was best in their culture and need have no fear of the establishment of an international government.

In conclusion, Professor Portus said that he would like to leave with his audience some words of that great and simple man, Albert Einstein. "This bomb", Einstein had said, "directly concerns every person in the civilized world. Science has brought forth this danger, but the real problem is in the minds and hearts of men. We will not change the hearts of other men by the machinery of procedure, but only by changing our own hearts and speaking bravely."

The Opportunities for Astrophysical Work in Australia.

In his presidential address to Section *A*, Dr. R. V. de R. Woolley (Canberra) said that from the time of Halley (1677) onwards, the stars in the southern hemisphere had attracted European and later American astronomers. A good deal of the work accomplished in the southern hemisphere had been expeditionary and there were few well-equipped observatories in comparison with those in the northern hemisphere, with the result that the southern stars still offered a rich field of objects awaiting investigation. Australia had two advantages for astrophysical work: access to the southern constellations, and also clear skies, the latter being especially favourable for stellar photometry. Descriptions of visual, photographic, photo-electric and spectroscopic observations were given, and some account of the extent to which observation in the southern hemisphere lagged behind that in the northern was sketched in each case. There was a great deal of useful work which could be done in Australia with modest equipment, but there was also a vast field of material awaiting investigation with telescopes, if not equal to the new giant American 200-inch and the several telescopes of 100 to 120 inches proposed or existing in the northern hemisphere, at any rate considerably larger than the 30-inch reflector which was the largest instrument at present in use in Australia. With this in mind, the Government had recently been asked to provide a 74-inch reflector for the Commonwealth Observatory. If this instrument was erected in Australia, the natural advantages could be exploited and there would be every reason to look forward to a period of great activity in this branch of physics.

Some Physical Problems in Diagnostic Radiology.

At a joint meeting of Sections *A* and *I*, Dr. C. E. Eddy (Melbourne) said that radiological physicists were now being asked to investigate problems of diagnostic radiology. These problems fell into two main fields: (i) the determination of the exposure conditions required to give a radiograph which correctly showed internal structures, and (ii) the specification of conditions which would permit the duplication of serial radiographs taken with different equipments. Since radiographs must often be taken with exposures of 400 milliamperes at 90 kilovolts in as short a time as 0·02 second, and since the photographic image was profoundly affected by variations in the efficiency of the intensifying screens, in the photographic emulsion and in dark-room procedures, careful control of a number of physical factors was required. For satisfactory serial radiography different equipments must be carefully standardized for exposure and processing factors, and methods which were being developed for routine use in hospital departments were described.

Trace Elements in Soils and Plants.

In his presidential address to section *B*, Dr. C. S. Piper (Adelaide) said that for more than one hundred years it had been thought that ten elements were sufficient for the normal healthy growth of plants. Fifteen elements were now known to be essential, but some of these were needed in extremely small traces only. Knowledge of the effects of these trace elements in soils and plants was comparatively recent, most of it having been gained as the result of researches carried out in the last twenty-five to thirty years.

Nearly sixty different elements had been detected in plants, but not all were necessary for growth. The proof of the essential nature of an element rested finally in the growth of plants in nutrient solution in the presence or absence of the element under test. Because of the extremely small amounts involved, the utmost attention must be given to the purity of all reagents used. The effect on growth of an amount of copper as small as one part in one thousand million parts of nutrient solution could be readily demonstrated.

The trace elements of interest in agriculture were manganese, copper, zinc, boron and molybdenum. In addition, cobalt, fluorine and iodine were of importance in animal nutrition. These elements were contained in most igneous rocks. In the process of soil formation, decomposition of the minerals occurred and the elements were set free in other forms.

In some cases soils were developed on parent material extremely poor in one or other of the trace elements. In other cases some chemical factors operated in the soil to reduce the availability of the element below that necessary for plant growth. In either case plants on the affected soils failed to make normal growth and exhibited disease symptoms which were characteristic of the particular deficiency.

The soil scientist was beginning to understand some of the reactions governing the occurrence and availability of the trace elements in soils. Soil acidity or alkalinity was one of the main factors controlling this availability. For example, manganese was made more readily available by acidification of the soil, whereas the availability of molybdenum was decreased. In some countries manganese and boron deficiency diseases had been induced by over-liming.

A joint discussion on trace elements in soils and plants, in which Sections *B*, *K*, *L* and *M* took part, followed Dr. Piper's address. A paper on "The Uptake of Molybdenum and Copper by Plants on Various Soils" was read by Dr. C. S. Piper and R. S. Beckwith (Adelaide). "The Effect of Cobalt Treatment on the Cobalt Content of Subterranean Clover Pastures" was discussed by Professor E. J. Underwood (Perth). H. O. Askew and Miss E. B. Kidson described "The Control of Magnesium Deficiency of Apple Trees in Nelson District, New Zealand", and T. N. Stoate spoke of "Nutrition Studies in Western Australian Pine Plantations".

Proteins and Enzymes.

Section *B* arranged a joint discussion with Sections *K*, *N* and *I* on proteins and enzymes.

Libraries and Literature.

At a combined meeting of Sections *A*, *B*, *C*, *D*, *K*, *L* and *P* a discussion on libraries and literature took place. The following papers were read: "Literature and Information in Relation to Research", by J. E. Cummins; "The Organization of an International Clearing House for Scientific Knowledge", by M. R. O. Millett; and "The Need for Destructive Criticism", by G. W. Leeper.

Depleting Mineral Resources—A Challenge to Geology and Geophysics.

In his presidential address to Section *C*, Dr. H. G. Raggatt (Canberra) said that the large quantities of minerals required during the second World War had accelerated depletion of resources to such a great extent that the whole world, and not only those associated with the mineral industry, had become aware that known resources of many minerals would be exhausted in the foreseeable future. This was a challenge to man in many ways, but primarily to geology and geophysics. The method which had been most successful in finding ore was a careful investigation and analysis of the structural conditions in which ore bodies occurred. A good example of the successful application of this method was the work done on the southern extension of the Broken Hill lode between 1937 and 1940. It was therefore more necessary than ever that investigation of the structural and lithological conditions in which the more important ore masses occurred should be intensified and that their chemical and physical properties and their susceptibility to detection by geological and geophysical methods should be examined. Investigations must be continuous and continually reexamined in the light of new concepts.

Fluctuation of Animal Populations.

In his presidential address to Section *D*, Dr. A. J. Nicholson (Canberra) said that animals living in undisturbed natural environments tended to maintain characteristic degrees of abundance; but their numbers generally fluctuated about these levels with more or less violence according to the species and to the conditions under which it lived. Evidence

was presented to show that both fluctuation in numbers and the tendency to maintain characteristic levels of abundance were end-results of the same underlying cause, which was competition between the animals for the things that were necessary for their existence. This competition took many forms, the more important of which were illustrated by taking examples of animals that had been adequately studied. Competition for food seemed to be of dominating importance, although its effects were often produced indirectly. Animals that lived in small circumscribed areas, such as islands, if unchecked by anything else, increased until they had destroyed their food supply, when they died out. In large areas in similar circumstances, as had happened with *Cactoblastis cactorum* and prickly pear, both the food and the animals themselves were reduced to a level of great scarcity which was maintained indefinitely, although the numbers of the animals and the abundance of their food fluctuated violently in any small area examined. Lemmings and locusts relieved the population pressure by massed migration just before lethal effects of food scarcity occurred, so that their numbers oscillated violently in time. Many birds and mammals laid claim to "territories" by pairs or small groups, driving the unfortunate surplus individuals into environments where survival and successful breeding were more difficult. This habit strongly damped the fluctuations which competition for food tended to produce. Similarly, cannibalism and lethal combat within a species destroyed the surplus individuals and led to population stability. Certain predators (lions for example) could attack only the weak and the stragglers, and by so doing maintained the populations of their herbivore prey in a healthy condition at a density below the starvation level. Other more efficient natural enemies, such as many insect parasites, made their prey so scarce that they could destroy only a small fraction of their available food supply. Climatic fluctuations, by altering the favourability of the environment, caused corresponding fluctuations in the abundance of animals that were subject to a stable system of control, and often determined the time of occurrence of fluctuations that were primarily due to other causes.

The Concept of Sovereignty.

In his presidential address to Section *E*, Professor G. V. Portus (Adelaide) referred to a difficulty of the social sciences in having to employ words already in everyday use with various meanings. The natural scientists escaped this by having a terminology of their own. The theory of sovereignty had emerged at the end of the Middle Ages as a justification for the authority of the new national monarchs against the external power of the papacy and the internal power of their own barons. As power passed from kings to parliaments the theory had had to be modified. The German-English idealist school had developed the view that the State had a will and personality of its own which no individual could or should oppose. Here was the germ of modern fascist theories, that power was its own justification.

Another development, due to English jurists, was the distinction made between legal sovereignty (which resided in parliament) and political sovereignty (which resided in the electorate). This was lucid enough as applied to Great Britain; but where was sovereignty in Australia—in the Federal Parliament or in the electorate or in the referendum votes? Fortunately the founders of the Commonwealth had not put the term "sovereignty" in the Federal constitution. They had used the less ambiguous word "powers".

In modern States, powerful pressure groups fought the State, sometimes successfully. Examples were the Ku Klux Klan in America, the English general strike of 1926, the waterside workers in Australia. Modern theories of pluralism emphasized this, viewing the State as one association along with other associations within the wider matrix of society. The State was the strongest of these associations, but it was not all-powerful. Other groups—the church, the trade unions, the universities, the family—had a sovereignty of their own, which, whatever might be its theory, the State could not in practice override.

Turning to the external aspect of sovereignty, Professor Portus characterized the sovereign State as an international menace. He said that no State had been willing to give up its national sovereignty at San Francisco in 1945, although this had made effective international government impossible. Science, commerce, broadcasting and communications had bound the world together; but in politics there was a lag behind and the national sovereign States were anachronisms. National sovereignty was deeply rooted in the emotions, and nations on the whole were behind their leaders in refusing to surrender it.

Professor Portus suggested that the word "sovereignty" should be dropped from political discussions and left to the lawyers, who seemed to want it. The simpler words "power" or "authority" could be used, and escape from the mysticism and emotion which hung around sovereignty could thus be achieved. Political ideas should not be thought of in terms of "right" or "wrong", nor as "true" or "false". Rather should they be thought of as "useful" or "not useful". In that way might be solved the problem of where to put authority, both within States and in the wider circle of the world, along the lines of experimental federation.

Professor A. C. Fox (Perth) thanked Professor Portus for his paper. He suggested that sovereignties could coexist. He thought that one should beware of an analogy with scientific methods. The scientist about to experiment started out with a definite specific idea. Behind it was his knowledge of his subject—for instance, physics. In morality one started out with a conviction; it was not a matter for experiment. So it was with sovereignty. One started with the conviction that a fundamental order was possible, and men fumbled and experimented to know how that order could be attained. The idea of obedience was bound up with the concept of sovereignty; it assumed a personal relation, but the person must be authorized. Plato had presented two extreme forms of sovereignty—the rule of the philosopher-king and the rule of the tyrant. The philosopher-king was supposed to have found out the principles of things, the very nature of goodness. The rule of the tyrant—power without authority—was the worst possible kind of rule.

Professor Fox said that one thought of sovereignty not as obedience to principles as such, nor to persons as such, but to an amalgam—a joint working of persons and principles. The idea of eternity was necessary to call out all one's allegiance. He suggested that Professor Portus had, possibly unintentionally, implied contempt for the moral law behind politics. The truth was that it was the moral quality of political power which was its final justification. Every revolt was made in the name of right.

Professor R. M. Crawford (Melbourne) paid a tribute to Professor Portus and said that he had been pleased by the latter's choice of subject. Professor Crawford said that people should ask themselves what in fact happened in this matter of sovereignty, how in fact people behaved. In order to answer these questions, one must take account of the spiritual and moral issues, since in practice these did affect people's behaviour.

Professor F. Alexander (Perth) agreed that it would be healthy to discard the term "sovereignty" and frankly to use the term "power". But in the interests of society and of world stability, limits to the use of power must be set in terms of principle. Professor Portus had rather easily dismissed the moral law as a conservative restraining influence on authorities seeking to experiment in the interests of society. One could not experiment on one's use of power unless one had certain principles in mind. The use of a code of ideals was not necessarily a restraining or hampering influence. It was all to the good that people should be frank and realistic about the power exercised by a number of bodies in the State or in the world; but at the same time they should seek to obtain more general recognition of the principles governing the right increase of power. Their conception of these principles might vary from time to time, and from person to person, but a recognition of their existence was important. Professor Crawford thought that it would be of interest to read, in conjunction with Professor Portus's paper, a lecture published by his predecessor in Adelaide, Professor Hancock, and entitled "Machiavelli in Modern Dress".

Professor Portus, in reply, said that people should ask themselves what were these sanctions, these principles of morality, what was the ultimate good. They should also ask whether the moral law was laid down for them or whether they created it as they went along.

Anthropology and the Study of Languages.

T. G. H. Strehlow (Adelaide), in his presidential address to Section *F*, said that the greatest single barrier between the student of anthropology and the community in which he wished to work was, normally, the lack of an efficient medium of communication. All were aware of the need for scrupulous accuracy in regard to technical expressions in the study of sciences and institutions. Hence it was regrettable that in the past so little stress had been laid on the study of the native languages themselves in anthropological research. An instance of a great and well-known anthropological work marred by lack of linguistic knowledge was Spencer and Gillen's world-famous book "The Arunta". These authors were the two great pioneers of Australian anthropology; mistakes and errors of procedure were inevitable in a work of this kind. Practically all errors could have been avoided had either of the authors

possessed a thorough knowledge of any of the languages spoken by their informants. Ceremonies and symbols were often meaningless unless one knew their spiritual and psychological significance. To the natives, a ceremony was useless and magically inoperative unless validated by the spoken or the chanted word; it was this which gave it either a sacred or a magical character. It was the word which quickened the dead symbolism into life. Sacred chants, in Australia anyway, were composed, probably in every tribe, in archaic poetic languages which were not used in ordinary daily conversation. The older anthropologists too frequently threw up their hands in despair and consoled themselves for their own inability to understand the chants by suggesting that natives, too, were equally ignorant of their meaning. In the end the language difficulty was partly solved by a gifted native's ability to express himself in reasonably fluent English, and the ceremonial chants were explained. This was only one instance of what had happened too often in Australia. Those who could speak the aboriginal languages most fluently—missionaries, dingo-scalpers, prospectors and other people in life-long contact with the natives—were too often neither interested in folk-lore nor sufficiently well trained to delve into such matters.

Many more research workers were needed to set down wholly dispassionate accounts of the legends, the chants, the comments on religious and ceremonial matters, and even the casual conversation of their native informants. It was important to record the material which would reveal the world of ideas of so-called primitive peoples and which would throw light on their mentality. An old anthropologist had made the following statement about the Australian natives ("The Arunta", 1927, preface, page viii):

> Australia is the present home and refuge of creatures, often crude and quaint, that have elsewhere passed away and given place to higher forms. This applies equally to the aboriginal as to the platypus and kangaroo.

A modern anthropologist had replied in the following terms (M. P. Ashley Montagu, "Coming into Being among the Australian Aboriginals", page 67):

> The Australian world is essentially a spiritual world, and material acts are invested with a spiritual significance. Human beings have a long spiritual history behind them and the spiritual source of every member of the tribe is known. The spiritual origin of children is the fundamental belief and among the most important stays of the social fabric.

This change of attitude had been brought about by the learning of native languages.

Mr. Strehlow went on to say that the two characteristics that were the special prerogatives of man alone, and which set him apart from all animals, were true articulate speech and conceptual thought. No human being could be accurately rated as to his intelligence or adequately understood with regard to his thoughts and emotions unless his special cultural background had been sympathetically and comprehensively understood. This involved an intimate knowledge of language. Language studies proved that every human community was influenced by moral and by ethical concepts, though these were frequently different from those that swayed or inhibited the investigators' own modes of conduct.

None of the writers who decried the native languages were themselves trained linguists who could speak any of these dialects fluently. Some idea of the high complexity of an Australian aboriginal language was afforded by a study of the conjugational system in Aranda. The Aranda verb, by means of agglutinating verbal suffixes and infixes, could express no less than 95 tense forms, four voices and three numbers. It was a sign of intelligence of the average native that he was able to speak his intricate language without faltering and without grammatical mistakes, whereas in white society only a relatively small section of the population achieved any real measure of fluency, correctness and assurance. Also native languages were adaptable. Mr. Strehlow said that from his own observation of the Aranda spoken at Hermannsburg, it was clear that members of the third generation of converts born at the mission had successfully developed a vocabulary which expressed most of the common terms of Christian theology in their own language. The trained linguist need not fear that it would be beneath his dignity to study the language of an Australian aboriginal tribe. One particular avenue of research was a thorough investigation of the beliefs, rites and many ceremonies of native Australian women. This was an almost untouched field, and no male investigator had any chance of elucidating these female mysteries.

In conclusion, Mr. Strehlow said that anthropology had studied man as a tool-using animal; it had studied man as a social animal living in an integrated community; it should devote more and more time to studying men as thinking beings. Investigators must learn to see in "primitive natives" not merely trackers, magicians, Stone-Age craftsmen and artists, or walking bundles of psychological complexes, but living men and women, whose thoughts and whose emotions were often curiously like their own. They would then understand the great truth that mankind was one large, indivisible family.

Contributing Causes of Aboriginal Depopulation in Western Australia.

A. O. Neville, formerly chief protector of aborigines in Western Australia, said that that State's total native population in 1900 was given as 12,307, not including East Kimberley natives and those outside civilization. At the present time the full-blooded natives within civilization numbered 10,891, with an excess of 1473 male adults, and only 1788 children. It was through no deliberate action of the early settlers that native depopulation accompanied settlement; but it was a fact that the main industries of the north had all contributed to it, though often indirectly and unwittingly. The finding of the first pearls in 1851 had marked the beginning of a desperate phase for the aborigines. Bad though it was, the actual employment of the aborigines was not so dreadful as the manner of their recruitment. Blacks had been rounded up by armed parties, chained and led away to what was little less than slavery. Not all labour was so acquired. Some men combined pastoral pursuits with pearling, using their natives in both, and many of these masters were humane men. In the Kimberleys, natives said to be cattle killers were imprisoned for up to three years. The police were given a *per capita* monetary allowance for feeding each native brought in. This system resulted in such enormities that it was the subject of a Royal Commission; but in the meantime many natives died. Eventually it gave place to a humane and successful innovation—the establishment of cattle stations solely for providing food for native people, and where such places existed, cattle killing had ceased to be a matter for concern. Could one wonder that when so many able-bodied men were torn from their womenfolk the birth rate declined alarmingly? With the opening up of the north there had also been a rapid decline in the number of females surviving birth.

Another government activity founded with the best of advice was the establishment in the early years of the twentieth century of hospitals on Dorre and Bernier Islands to treat, respectively, male and female subjects of venereal disease. Many deaths had occurred in these hospitals. It was found later that the incidence of the disease was not so great as had been suggested. Contrary to many assertions, aborigines were on the whole healthy, if undernourished.

Mr. Neville then considered the part played by the native in his own dissolution, which seemed to have begun before the white settlement of Australia. It was true that since white men had come to Australia the aborigines had been indulging in practices calculated to wipe themselves out without any help. Ever since the white men had known them, the aborigines had been killing each other for a variety of reasons, but mainly for revenge or at the will of the elders. It was generally the strong and able ones that were destroyed—those most feared by the elders as likely to dispute their authority. It was difficult to appreciate the extent to which abortion and infanticide had influenced depopulation. Infanticide could account for the disparity between the numbers of males and of females. Abortion seemed to occur as an economic corollary in times of drought. The extent to which certain rites had interfered with the birth rate was still the subject of inquiry. One of the factors in retarding natural increase was polygamy amongst the elders, which greatly accentuated the difficulties experienced by young and vigorous men in obtaining wives.

In conclusion Mr. Neville said that indigenous primitive peoples seemed to reach a zero hour, at which they were faced either with extinction or with their acceptance of new methods which might save them. The Australian aborigines had surely reached that stage, and the white inhabitants must see to it that the aborigines' acceptance of their way of life raised them to new standards of health and happiness and to the abandonment of all that was evil in a culture which was outworn and often repugnant.

Speech Sciences Unit.

Miss Olive Abotomey (Adelaide) read a paper on "Speech Therapy and the Speech Sciences" and also a paper on "Speech Sciences in New Zealand".

Miss M. Badcock (Melbourne) read two papers on "The Scope of Speech Therapy" and "Speech Therapy and Aphasic Patients".

Miss Elinor Wray (Sydney) spoke of "Some Aspects of Speech Therapy and Results of Treatment".

Dr. Noel M. Cuthbert (Perth) read a paper entitled "Diseases of the Nose and Throat Affecting Speech".

Dr. P. C. Tresize (Perth) discussed "Some Psychiatric Aspects of Speech".

A demonstration and a lecture on the subject of sound measuring and testing were given by officers of the Postmaster General's Department.

New Times—New Metals.

Professor J. Neill Greenwood (Melbourne), in his presidential address to Section *H*, pointed out that engineering designers were naturally limited by the properties of the materials they could use. In the old days lack of knowledge could be compensated by using more metal than was really necessary. Development of small, powerful marine craft, and later of aeroplanes, necessitated more efficient use of metals—weight as well as strength had to be taken into consideration. Engineers developed machines for testing the strength of their metals; but it was found in practice that frequent repetition of loading caused failure at lower stresses. Properties had to be determined under fluctuating load conditions. It was then found that properties were affected by design features, by the kind of surface finish and by accidental or intentional tool marks. Thus an inspector's stamp indicating approval might be the cause of failure of an aeroplane part owing to the notch effect of the stamp. Properties of metals were also affected by the surroundings in which they were used. Thus machine parts operating in contact with water failed more readily than those in air or oil. It was, however, when engineering designers moved into the field of high temperature operations in power plant development that most troubles developed. Under these conditions the properties of metals were not constant—they might improve or deteriorate, according to the type of alloy and the nature of the surroundings. In the last twenty years they had moved from the dull red heat of superheated steam turbines to the bright red heat of gas turbines and jet-propelled units. Working parts were now needed to operate satisfactorily at temperatures approaching the melting point of copper or cast iron. New alloys were necessary. It was almost certain that for these purposes iron and steel would cease to be the great standby of the engineer. New metals would be developed, and amongst these were titanium and zirconium—both constituents of the beach sands of eastern Australia.

In the field of atomic energy completely new requirements were found. The penetration by, and absorption of, certain subatomic particles created radioactivity in metals, and means of providing shields from these radiations would need to be incorporated in designs.

Professor Greenwood said that, on turning from the engineering to the architectural uses of metals, it was shown that these had been used for artistic and decorative purposes since the earliest historic times. It was probable that with the introduction of mass production methods into building construction, greater use would be made of metals. Aluminium and stainless steel offered useful and artistic possibilities in this direction. Aluminium could be dyed to any colour and so could add chromatic effects which were not possible with the more conventional building materials.

Housing Standards in Australia.

J. S. Gawler (Melbourne) traced the development of housing in Australia from the earliest days up to the present. He pointed out that in the 1933 census it was disclosed that 712,172 out of a total of 1,434,519 private homes in Australia were constructed with wood framing. He analysed the process, design and lay-out, and referred to the effect which social distinctions had had upon the evolution of housing standards and the change brought about by the strong sentiment throughout Australia for home ownership amongst the great mass of the people. He drew attention to the bad housing conditions and congested areas of the major cities of Australia and to the ill-advised permission given in the early days for land to be subdivided into ridiculously small allotments.

Mr. Gawler enlarged upon the minimum standards of accommodation for housing as set out by the Commonwealth Housing Commission, of which he was a member, in its final report in 1945. In this report the commission laid down that "a dwelling of good standard and equipment is not only the need but the right of every citizen". Mr. Gawler held that this standard should be the minimum applied to homes for the lower paid wage-earners, with whom the commission was mainly concerned.

Mr. Gawler advocated a minimum standard of housing for all people in all parts of the country—tropical, subtropical and temperate, remote country centres and crowded cities. This standard should set the minimum accommodation and sizes of rooms, and cover light, ventilation, heating and essential fittings for living comfort. He then described the standards recommended by the Commonwealth Housing Commission in its report of 1945.

With regard to the present position in Australia, Mr. Gawler referred particularly to the increased cost of building and gave an example of a survey made by the Box Hill (Melbourne) City Building Surveyor, showing that six brick houses cost on an average £2316 (£143 per square), 31 brick houses cost on an average £1710 (£132 per square), and 24 timber-framed houses cost an average of £1351 (£116 per square). On the average worker's earnings (not more than £7 per week) it was obvious from these prices that interest and sinking fund and other charges could not be met without some form of governmental rental subsidy.

Mr. Gawler then discussed the cost of public utilities associated with housing, such as road construction, water mains and electric mains. He illustrated his comments with the following information, published by the County of Cumberland (Sydney) Town Planning Commission: Manly, population density 10 per acre, cost £106 per house; Vaucluse, population density 11·4 per acre, cost £105 per house; Sutherland, population density 2·4 per acre, cost £352 per house; Warringah, population density 2·9 per acre, cost £368 per house.

Mr. Gawler completed his paper with suggestions for improving the housing of the Australian people by (*a*) a reduction in cost of construction, (*b*) improvement in the types of houses, (c) town planning in the areas concerned, (*d*) an investigation into the reorganization of the domestic building industry. In his review, Mr. Gawler advocated amongst other things, the adoption of an eight-foot ceiling height, sizes of allotments of land not larger than householders were capable of neatly and efficiently developing, and the building of flats for married couples without children and for single people not able to live in single family homes. He advocated minimum standards of habitation for various sections of the people, to which health departments and local government authorities should conform, and which should be the basis for up-to-date building regulations and town planning ordinances.

The Individual and the Environment.

In his presidential address to Section *I*, Professor A. A. Abbie (Adelaide) said that an anatomist, called upon to address a medical gathering of diverse interests, was exercised to discover in his professional stock-in-trade what was likely to hold the widest appeal. He was, however, only a biologist with a bias towards the human. General biology was now beyond the scope of one individual; but he had assembled a group of ideas which might provide his hearers with a useful background in their daily dealings with the human animal.

Throughout the evolutionary processes which culminated in man, there had been a progressive intensification of chemical, biological and neural factors leading to the emergence of a definite individuality. Modern man was a product of the interaction of his hereditary constitution with his environment. The individual was but an event in time—temporary custodian of an endless living stream—and any attempt to consider him otherwise was to forget all that had gone before and to ignore all the possibilities of the future. Man had inhabited this earth for perhaps a million years, a mere fraction of the thousand million or so during which life had existed. It was less than 10,000 years earlier that neolithic man first established fixed settlements with a mainly agricultural basis. During that time he had gradually acquired more and more mastery over forces of which he was once the victim. This control had accelerated progressively, so that there had been more change in the past two hundred years than in all the previous ages. The result was modern civilization, which was almost exclusively a product of western European thought. Why, then, should the very people who had achieved this astounding success be facing biological failure?

Civilized life was now very complex; but the average human intellect had not improved in the past hundred years, and despite the material and physical benefits of civilized life, the modern mind was becoming less and less able to cope with all the problems of modern existence. As a first result, the white peoples were failing to reproduce themselves sufficiently to maintain their present numbers, and because this failure affected the thinkers more than the non-thinkers, the general level of intelligence was beginning to

decline. When they gained the mastery over their physical environment, the white peoples erected a mental environment which was now becoming their own most serious competitor for existence. One grain of comfort remained: all forecasts were based on the assumption that existing conditions would continue. Some pioneer English demographers of the century 1660-1760 had deplored the falling birth rate, which threatened England's future, and the reasons alleged—low marriage rate, immorality, alcoholism and abortion—were on a par with similar complaints at the present time. Within forty years Málthus had published his famous essay to give warning that the rapidly expanding population would soon outgrow its food resources. The two views were opposed, and both were wrong, for neither could take into account the impending industrial revolution, with its astonishing increase in both population and food resources. So it was at the present time. A new source of power could magnify the few to a force before which mere numbers paled, or better health of the aged might render increase redundant. A changed political outlook could make reproduction fashionable again, or reproduction might become a State industry. Also the trend of human evolution was towards improved health and physique and protection of the developmental period. In modern white man this was leading to a gradual loss of adult structures, such as the wisdom teeth, and to a gradual enhancement of such juvenile characteristics as expansion of the brain.

This prolongation of youth was producing a prolongation of life as a whole, and this might one day become indefinite. It was quite possible that man would learn how to control this present slow trend and achieve for himself a virtual immortality of protracted youth. Potential immortality would bring problems beyond the contemporary human mind. The time for such knowledge was not yet, and they must hope that it would not, like atomic power, be thrust untimely upon an immature world.

A vote of thanks to Professor Abbie was moved by Dr. R. D. McKellar Hall (Perth).

Microbiological Assay of Folic Acid and its Use in Pernicious Anæmia.

Dr. N. Hayward (Melbourne) read a paper on "The Assay of Folic Acid and its Use in Pernicious Anæmia". She said that the paper was a preliminary report only and it was too soon for definite conclusions to be drawn from it. She drew attention to the importance of folic acid in the treatment of strict vegetarians, and described its use in the treatment of a patient who had refused to have injections of liver extract.

Dr. Cyril Fortune (Perth) thanked Dr. Hayward for her paper and asked her to convey his thanks to Dr. Bolton, with whom Dr. Hayward was collaborating in this investigation. Dr. Fortune referred briefly to the work of Barlow, of Kessel and of Spies. He emphasized the fact that folic acid was not the answer to the treatment of pernicious anæmia. Kessel and other workers were finding that some of the patients they were treating with folic acid had retrogressed.

The Effect of Prophylactic Sulphanilamide on the Streptococcal Carrier Rate in Rheumatic Fever Patients.

Miss Margaret C. Holmes (Melbourne) discussed the effect of small doses of sulphanilamide on the streptococcal carrier rate in patients with rheumatic fever. She said that in August, 1944, Dr. H. Lawrence Stokes, at the Children's Hospital, Melbourne, had started the treatment of a group of rheumatic fever patients with "prophylactic" sulphanilamide. Since September, 1945, routine throat swabbing had been carried out at the clinic to investigate the effect of this prophylaxis on the streptococcal carrier rate. The carrier rate had been practically unaltered by treatment. The mean monthly carrier rate for *Streptococcus pyogenes* was 19% in the control group and 16% in the treated group. Drug-resistant strains of streptococci had been isolated more frequently from the treated than from the control group, and some evidence had been obtained showing that this resistance had been induced by contact of the organism with sulphanilamide. However, examination of case histories had shown that during the administration of sulphanilamide in prophylactic doses the rheumatic recurrence rate, calculated in patient-years, had fallen from 13·8% in the control group (989 patient-years) to 4·5% in the treated group (338 patient-years). The investigation would need to be continued for a longer time before the clinical results could be considered conclusive.

Dr. Cyril Fortune (Perth) said that Miss Holmes had not explained why the recurrence rate had fallen although the carrier rate was unaffected. Many other factors might play a part. He thought the results were inconclusive, although he admired the work of Dr. Stokes and knew that it was recognized in Baltimore.

Profesor A. A. Abbie (Adelaide) was interested in the more frequent isolation of resistant strains of hæmolytic streptococci from the throats of the treated group of children. He asked whether this could be only an apparent increase due to the elimination of non-resistant strains.

Miss Holmes, in reply, said that it was hard to say. She thought that more than one cause might operate in the appearance of resistant strains of hæmolytic streptococci.

The Place of the Queensland Institute of Medical Research in the Australian Research Pattern.

Dr. E. H. Derrick (Brisbane) read a paper by Dr. I. M. Mackerras (Brisbane) and himself on "The Place of the Queensland Institute of Medical Research in the Australian Research Pattern". From the days of Joseph Bancroft, medical research in Queensland had been a series of episodes separated by periods of barrenness. Such episodes had included the work of the Institute of Tropical Medicine at Townsville, investigation of fevers at the State Health Department, investigation of tropical physiology at the Physiology Department of the Queensland University, and investigation of malaria and scrub typhus by army personnel. The Queensland Government, by establishing the Queensland Institute of Medical Research, had determined that medical research should have a permanent place in the life of the State.

In planning the development of the institute several principles operated. These included the following: (i) the transmission of infectious diseases as the central theme; (ii) the presence in Queensland of research problems of varying degree of urgency; with one notable exception—lead poisoning—these fell within the range of the central theme; (iii) cooperation with other Australian research bodies; (iv) the correlation of teamwork with freedom for the individual research worker.

To implement the research programme, it was hoped to establish sections of parasitology, virology, serology, bacteriology, mycology, pathology, animal ecology and biochemistry.

Dr. Derrick referred to the pioneer work of the late Dr. Anton Breinl, who, when he died in 1944, must have been glad to know that the research plan he had initiated thirty years before had progressed to the foundation of an institute of research.

Professor A. A. Abbie (Adelaide) said that members of the section were grateful to Dr. Derrick for coming so far to speak about the new institute. While in Townsville he had met the late Dr. Breinl, to whose pioneer work Dr. Derrick had referred.

C. J. Pope (Adelaide) thanked Dr. Derrick for his references to the work of the Cairns unit. Mr. Pope had been with that unit as biochemist; and he asked whether it was Dr. Derrick's intention to establish such units in outlying parts of Queensland.

Dr. Derrick, in reply, said that the main activity of the institute would be in Brisbane for the present. Later it was hoped to establish research stations in other parts of Queensland. The institute had purchased the whole of the equipment used by the Cairns unit.

Professor Abbie, referring to vectors of typhus, said that it was sad to contemplate the destruction of marsupials. He asked whether this was necessary or whether they could be "deloused" so to speak, and set free.

Dr. Derrick said that the bandicoot was a very good field worker—it was an excellent collector of parasites.

Dr. A. P. Davis (Perth) thanked Dr. Derrick for his paper. Dr. Davis had just attended a discussion on the development of the north-west and had been struck by the fact that the speakers had concerned themselves with the geology of the region, with its agricultural possibilities, with its suitability for cattle, and with the question whether, from these points of view, the north could be settled. It had seemed to him that in the ultimate analysis what mattered most was whether white persons could thrive and live comfortably there and whether they could withstand not only the adverse physical conditions, but the vectors of disease. An institute such as Dr. Derrick had described might well be established in Western Australia to collaborate with the Queensland institute in investigating the diseases of the tropics. The Queensland institute would obviously be of great benefit to the health of the people of that State.

Professor Abbie observed that the human animal was usually considered last. Preventive measures could do much to improve the health of a group of people. When the human animal was considered, good results followed. The success of the Italian campaign had been largely due to Sir Aldo Castellani, medical adviser to the army there.

A speaker asked whether there had not at one time been an institute of medical research at Broome.

Dr. A. P. Davis replied that some work had been done at Broome under the auspices of the Rockefeller Foundation. Also there had been a Commonwealth laboratory there. Entomological problems had not been tackled. He did not know whether the Commonwealth laboratory had been restaffed since the war.

Professor Abbie said that Australia was largely a tropical country. The north-east differed little from New Guinea. The tropical regions of Australia were the vulnerable points from a health point of view, as they were possible points of entry of disease.

The Profession of Medicine in Relation to a National Medical Service.

Dr. L. E. Le Souef (Perth) said that the main deficiency in the present-day health services was the financial burden to the patient with the feeling of insecurity and fear it brought. The heavy cost of modern developments in medicine, such as X-ray and other diagnostic services, and modern medicines, pressed more and more heavily on the ordinary citizen. It had devolved on the Government to bring all these benefits to all the people. The organized medical profession would actually welcome a national medical service which would not only lift this financial burden but also would increase the facilities available.

Attempts to improve the medical service to the nation by the medical profession had been ignored by succeeding governments over the past twenty years. In developing a national service all that had to be asked was: "What is best for the patient?" It was a personal service for the individual citizen and not for the Government. Administration and control became of paramount importance and should be safeguarded from unreasonable political interference. There should be adequate representation of the doctors on all administrative bodies, in order that they might make their contribution to the efficiency of the service. The practising medical profession, comprising the great majority of doctors, should receive adequate representation. Dr. Le Souef criticized the Government for turning to its departmental or health officers and ignoring the views and opinions of the practising members of the medical profession, on whose cooperation depended the success or otherwise of this scheme. With satisfactory administration the details could be worked out.

Obviously the family doctor should be preserved as the foundation of all practice, with freedom of choice by the patients of their doctors. In New Zealand it had been found possible to do this only by maintaining the present set-up, whereby people visited their doctor as at present, but the Government paid him on a fee-per-service basis. This doctor would disappear with a salaried service, and the patient's freedom of choice of doctor would be lost. Whilst certain types of practice might require salaried doctors, such as the aerial medical services, hospital resident staffs *et cetera*, it was the fee-for-service system which upset practice least and maintained the doctor-patient relationship best. The cost had been shown to be very little more than that of a capitation rate.

Necessary to the existing consultant, general practitioner and hospital services were sufficient diagnostic laboratories (including pathological and radiological facilities), extension of maternity services, a flying doctor service, industrial and other preventive medical services, hospital construction and equipment, with special reference to tuberculosis and mental diseases, chronic cripples and the aged, group practice initiated by the medical profession, and appropriate post-graduate facilities.

Finally, Dr. Le Souef said that no successful service could be expected unless those who had to implement it were not only consulted but given the right to play an important part in its development, administration and control.

Professor A. A. Abbie (Adelaide) said that Dr. Le Souef's paper was addressed to the public as well as to the medical profession. A national health service would not really mean free medical attention—everyone would pay for it, and it would ultimately restrict the liberties of the general public as well as those of the medical profession. Dr. Le Souef had put up a plea for the liberty of the medical profession to direct and control such a service.

Dr. F. W. Carter (Perth) said that he would like to hear some comments on Dr. Le Souef's address. He asked whether it was really necessary to take over the whole medical profession as one huge department of the Commonwealth Public Service in order to provide the stated object of the Government, which was free medical attention for the people. Suppose it was agreed, as a basis for argument, that all forms of medical attention should be freely available. The British Medical Association had agreed that this was desirable. The Government then assumed the role of an insurance body, insuring the whole population against the hazards of illness. The higher his income, the more the individual would pay for this service. The Government had already collected an unknown number of millions from the people, in the form of income tax and social services tax. The Government was therefore in the same position as any other insuring body—bound to provide this service and looking to the medical profession to supply it. But this was no reason for external control of the medical profession and the public. An analogy was provided by the *Workers' Compensation Act*, which operated without bureaucratic control. The medical profession had agreed to a certain amount of control in the operation of this act, in that the insuring body could call in its own consultant, if it cared to, to question the treatment of a patient. All this was possible under private enterprise. Why should such a system not be extended to include the whole of the population of the Commonwealth? This would be cheaper for the Govermnent—and consequently cheaper for the people of Australia—than any other proposed type of service. It would eliminate a number of the objections which had been sincerely brought forward by the British Medical Association.

Dr. R. D. McKellar Hall (Perth) thought it might be worth while putting before a non-medical audience the difference between the army medical service and the repatriation medical service. The former, which had been planned and controlled by the medical profession, had provided a magnificent service to men of the armed forces. In contrast there was the Government-controlled repatriation medical service, controlled by non-medical personnel, with its red tape, delays and interminable hindrances.

Miss Glasson (Perth) asked why Dr. Le Souef was so sure that a salaried medical service would be less efficient. She asked whether doctors were less honourable in discharging their duties than State school teachers or university professors. As for freedom of choice, many country people at present had no freedom of choice of medical attendant, but must consult the only doctor available.

Miss Talbot (Perth) supported Miss Glasson's views.

Dr. Le Souef agreed that those living in remote country districts had no freedom of choice of medical attendant; this was unfortunate, but unavoidable in the circumstances. There was no reason why limitation of choice should be extended to the large centres. The objection to a salaried service was not a question of honour, but of the divided control which regimentation would bring with it. The Government would be able to control the doctor's treatment of his patient. At present the doctor was the patient's confidant and was responsible to him. His records were not handled by clerks, as were the files of the Repatriation Department. Under a salaried medical service the doctor would be responsible to his employer, the Government, as well as to his patient. It was this divided control to which he objected. Another point was that the work of a man on a salary tended to become more impersonal. The salaried doctor would want regular hours, regular holidays and improved living conditions. Dr. Le Souef admitted that the fee-for-service system was, on the face of it, open to abuse. But all the objections raised to it had been raised when the *Workers' Compensation Act* had come into force. At the outset a committee had been formed to bring discipline to bear on the odd man who needed it; this was an intraprofessional discipline which did have its effect. Later a tribunal had been set up by the Government to deal with abuses; but in practice so few occurred that this had fallen into disuse. A speaker had drawn an analogy between school teachers and doctors, but there was nothing in educational work that was similar to the doctor-patient relationship.

In reply to a question, Dr. Le Souef agreed that patients admitted to the Perth Hospital were not free to choose their own medical attendant. This was not a good thing. He himself favoured the community hospital system, where there was freedom of choice of doctors.

Dr. F. W. Carter said that the British Medical Association did not object to salaried services as such, but doctors did object to being forced, as a whole profession, willy-nilly into the civil service. They would lose their liberty of criticism, their freedom of speech. The profession also objected to a system of promotion by seniority and to displacement to different parts of the Commonwealth. Those who argued that teachers, university professors, judges and others were content to be salaried government servants forgot that all these persons became government servants of their own free will. If a salaried medical service was instituted by the Government, all doctors would be forced to become civil servants. It was this element of compulsion

to which the medical profession looked forward with grave misgiving.

J. H. Prince (England) said that it was natural that every doctor would wish to prevent himself from becoming a civil servant. He asked whether the medical profession in Australia had any definite plan. In his opinion the Government in England would have to meet the profession's plan.

Dr. E. J. Thompson (Perth) protested against the last speaker's derogatory reference to the civil servant. Judged by his opinion on civil servants, his opinion would be of little value on anything.

Mr. Buckridge (Perth) asked whether it was not likely that there would be a tremendous increase in the number of patients under a free medical service. Possibly a greatly increased number of doctors would be needed.

Dr. Le Souef said that an increase in the number of patients or of visits to doctors was not necessarily a bad thing. The British Medical Association did have a plan. The principles under which the medical profession was willing to work had been known for years. The report of the Parliamentary Joint Committee on Social Security was full of wise planning, which had been ignored by the Government.

W. R. Houghton (Perth) asked, firstly, whether Dr. Le Souef or the British Medical Association had actually seen any draft plan or whether his remarks were based on inference from what had happened elsewhere. Secondly, he asked whether Dr. Le Souef could tell the meeting the number of general practitioners and specialists in Western Australia and how long their hours were. Thirdly, he asked what was Dr. Le Souef's opinion of the *Pharmaceutical Benefits Act*, especially in regard to the drugs included and the amounts prescribed.

Dr. Le Souef, in reply, said that his remarks were based on what had happened elsewhere and on what one had to guard against. He believed there were nearly 400 medical practitioners in Western Australia. It was impossible to state how long their hours of work were. He referred the question about the *Pharmaceutical Benefits Act* to Dr. Carter.

Dr. F. W. Carter said that there were formularies for drug prescription of all sizes and in all parts of the world, but none was complete. The only legitimate use of a formulary was to supply lists of prescriptions. Junior members of the medical profession used these until one of two things happened—either they graduated from the use of a formulary to the art of free prescribing or they remained in a rut. It was absurd to regard any formulary, especially the formulary of the Government of Australia, as complete. The Government had been asked to alter it and had refused.

Mr. Buckridge asked whether it was expected that the Government scheme would be a salaried one or based on the fee-for-service principle.

Dr. Le Souef said that he did not know what the Government scheme was. If it meant a salaried service, the public would suffer. In England the plan was a basic salary with a capitation rate. This he feared was the thin end of the wedge and would ultimately mean a salaried service.

Problems of Mass Microradiography.

Dr. A. J. King (Perth) said that mass radiography had developed as a control measure of tuberculosis only within the last ten years. The development of the photo-fluorograph and the automatic phototimer had made possible the survey within the past few years of millions of people throughout the world. In former years surveys were not possible, as the use of the standard 17 inch by 14 inch film was too expensive. It had now been shown that the four inch by five inch film, the 70 millimetre film and the 35 millimetre film all had sufficient resolving power to detect with a high degree of accuracy any tuberculous lesion present. The problem now was not the machine, but the man. The diagnostic error in the reading of films was still excessively high. Training was required to replace uncertainty with exactitude. The problem of fatigue was also very real.

Large-scale surveys in communities similar to the Australian community had shown that the incidence of the reinfection type of tuberculosis in the adult population was from 12 to 15 per thousand. Usually two to three per thousand were cases of active infectious disease. Education of the public was necessary. The disease might be present in presumably healthy persons and completely unsuspected. The main problem was to persuade people to present themselves for survey. A return of 90% in a voluntary survey was a very good result. Mass radiography of the clothed subject was now advocated in America, the narrow margin of possible error being counterbalanced by the convenience and speed. In Australian communities, smaller than elsewhere, the generally accepted method of taking the miniature films with the subject stripped to the waist could be followed. A necessary practice was the mass radiographic examination of all patients admitted to general hospitals. It was known that 20% to 40% of all persons admitted to hospital had tuberculosis at some stage of development, the incidence being much higher than in the general population.

The Western Australian Government had recently acquired Cathedral Hall in Murray Street, to be used as a tuberculosis control centre. It was hoped to have a transportable unit for the metropolitan area, and also another completely mobile unit for country centres. With satisfactory operating conditions and a sufficiency of trained personnel, 300 to 500 persons per day might be surveyed. Any findings in a survey must, of course, be strictly confidential. Dr. L. Henzel would speak of the correlation of ancillary services, on the necessity for clinical and bacteriological confirmation of a diagnosis made by X-ray examination, and on the sociological aspects.

Dr. King went on to say that tuberculosis was a world-wide problem and Australia was a low mortality area. The migration of any large numbers of people from high mortality areas must be guarded against. The population was to small to absorb them. The examination of immigrants was a problem for mass radiography. It was possible that the incidence of tuberculosis among immigrants from Europe could be five to ten times as high as that among Australians. In conclusion, Dr. King acknowledged his indebtedness to Dr. Herman Hilleboe, from whose editorials in the "Special Tuberculosis Control" issues of the *United States Public Health Reports* he had quoted freely.

Dr. L. Henzel (Perth) said that miniature fluorography served one purpose, and one only—to select certain persons for further investigation. It was not an end in itself, but was the first of a whole series of steps, the ultimate aim of which was to discover those persons in the community who were sufferers from tuberculosis. Some of these would have active and infectious disease and would require treatment and isolation. Others would have inactive disease which might become active subsequently and would need further observation. The ultimate goal was the control and elimination of tuberculous disease from the community.

In a radiological survey of the population many other lesions and abnormalities of the lungs, heart, blood vessels and diaphragm would be discovered apart from tuberculosis; this increased the value of the survey. While the technical difficulties of the survey had been largely overcome, there were always occasional discrepancies in the reading of the films. All photographs should be read by at least two different observers on different occasions. It was usually necessary to recall about 2·5% of the persons surveyed for further X-ray examination. Every subject with a radiological abnormality required complete clinical and bacteriological examination. Another point to be emphasized was that tuberculosis was a sociological and economic disease. The family history and investigation of contacts were important. It was often essential to admit the patient to hospital, and this presented an immediate economic problem. An economic safeguard for his dependants must be provided.

If there was to be any exclusion of age groups of the population from the survey because of the large numbers involved, an economical procedure would be to exclude all persons under the age of fifteen years and all women over the age of fifty years unless there were good reasons to the contrary, such as close domestic contact with a known sufferer from tuberculosis.

Hospital accommodation was important. It was usually estimated that a campaign for tuberculosis control needed hospital accommodation of at least three beds for each annual death. Australia as a whole was lamentably short of hospital beds for the tuberculous. It had been asked whether it was worth while to conduct a survey if there were insufficient beds to provide isolation and treatment of the persons with active disease so discovered. The answer was an emphatic "yes". The danger of contact with an unknown subject of tuberculosis was infinitely greater than it was with a known sufferer. Moreover, when a survey had been made, more economical use of existing beds and staff could be made by a selection of the patients for admission to hospital. It was the responsibility of those inaugurating a survey to arrange for the after-care and rehabilitation of those who were found to have pulmonary tuberculosis. In a successful survey an organization for publicity and propaganda was essential. One of the major problems in Australia was the lack of medical men who were trained and experienced in anti-tuberculosis work. A further need was the recruiting and training of tuberculosis nurses.

In conclusion, Dr. Henzel said that mass radiography was the trigger that would set in motion the whole organization of tuberculosis case-finding, treatment and control. The

organization needed to be like an army on active service, for the fight was a real one, and at the present the members of the community were the vanquished.

Dr. A. A. Merritt (Perth) said that the radiologist's problems in mass miniature radiography were the production of readable films and the interpretation of those films. Far from being a new concept, the photography of a fluorescent screen image, which was the basis of miniature radiography, had been attempted by Bleyer some six months after Röntgen's first discovery. Fogging of the photographic plates had led to its abandonment; but in 1909 Köhler and his co-workers had developed a system of mirror reflection of the fluorescent screen, whereby the camera could be left out of the direct line of the beam. Some two years later, Caldwell in America had established the basic criteria for photo-fluorography and had been able to demonstrate the superiority of the camera over the human eye in the recording of screen impressions. In 1935, De Abreu, of Brazil, had first used the method in large-scale investigations and had established its practicability. With the onset of war, America, Germany, Britain and Australia had used the method for "case-finding" in routine examination.

Dr. Merritt went on to describe the basic apparatus used. He said that in setting up apparatus for a mass scheme it was desirable that X rays should be directed to an outside wall in order that persons within the building should not be subjected to excessive radiation. A great advance in this type of photography was the photoelectric timer invented by Morgan. Before the advent of this apparatus each patient was measured and his exposure time was calculated. No accurate adjustments could be made for his inherent characteristics. Some people absorbed X rays more than others of the same dimensions. The tough, hard-working, well-muscled little man might be only as thick as the medium-sized woman; but the picture produced with the same exposure would be entirely different, and it was this difference in quality which had been one of the difficulties faced by the film reader. Now, by the use of the photoelectric timer, the exposure was automatically controlled, not to the thickness of the patient, but to the amount of fluorescence on the screen. This gave constant densities for the regions of the chest in which tuberculosis was usually found.

Dr. Merritt then discussed the problem of interpretability of films. He said that poor films were traps which ensnared the unwary. If the films were reasonably good, the interpretation of microfilms was sufficiently accurate for the purposes of a survey. Fatigue was the factor which most influenced interpretation, especially if accurate diagnosis had to be made from a small film. The United States Veterans' Administration had established a board to investigate the effectiveness of various roentgenological and photo-fluorographic methods. The findings of this board had been published in *The Journal of the American Medical Association* in February, 1947.

At the conclusion of these papers a motion picture showing the organization of a microradiography centre was shown.

Dr. Woolf (Perth) observed that Dr. Henzel had not mentioned tuberculin testing, and asked whether it would not be less expensive to commence a tuberculosis survey by routine Mantoux tests. He also asked whether a Mantoux test might not be of more use than bacteriological examination in the diagnosis of a very early lesion.

Dr. Henzel replied that in his own experience, no matter how early the lesion, if it was active, he would expect acid-fast bacilli to be present, and in fact he would not deflate the lung unless the diagnosis had been confirmed bacteriologically. As to the use of the Mantoux test as a screen, it was again a question of time and money. Those who reacted to the Mantoux test must come for three visits, those who did not, for four visits. This would take up more time both for the patient and for the medical staff.

A Preliminary Report on the use of Bacille-Calmette-Guérin Vaccine in Adelaide.

Miss G. E. Page (Adelaide) reviewed the history of Bacille-Calmette-Guérin vaccine, which had been used as a vaccine of living organisms for increasing resistance against tuberculosis. She said that evidence for the effectiveness of the vaccine was not irrefutable. Methods of application and the groups of the population taking part in experiments had differed widely. Much work had been done in Scandinavian countries, with results which were encouraging even though they might not be considered statistically satisfactory. From America, Aronson and Palmer had presented statistical evidence of the efficacy of Bacille-Calmette-Guérin vaccine for the first six years of vaccination among North American Indians. Bacille-Calmette-Guérin vaccine was also being used extensively in South America and Russia.

New possibilities for vaccination against tuberculosis had been opened up with the discovery, by A. Q. Wells in 1937, of the existence of tuberculosis in the wild vole, and with the isolation of the causative organism, which was now concluded to be the murine type of mammalian tubercle bacillus, commonly called the "vole bacillus". Some workers believed that vole vaccine would supersede Bacille-Calmette-Guérin vaccine, as it seemed to have the advantages of being a more potent immunizing agent, of possessing a more stable virulence and of causing a tuberculin allergy which was stronger and occurred earlier than that invoked by Bacille-Calmette-Guérine vaccine.

In response to a request by Miss Nancy Atkinson to Professor Dalling, cultures of Bacille-Calmette-Guérin and of the vole bacillus LV285 had been sent to Adelaide from England by Dr. Stableforth. Miss Page described the preparation of Bacille-Calmette-Guérin vaccine and of vole vaccine from these cultures. Guinea-pigs were used for preliminary tests of the virulence of the Bacillle-Calmette-Guérin vaccine and of its protective effect. In a second series of experiments a group of animals vaccinated with the vole bacillus was included. The results obtained, while not statistically significant, were considered sufficiently encouraging to justify embarking on the vaccination of human volunteers with Bacille-Calmette-Guérin vaccine. It had been shown that the strain of Bacillle-Calmette-Guérin was harmless and probably effective. Miss Page said that she herself, who had up to that time failed to react to tuberculin, was the first person to be inoculated. Subsequently thirty volunteers were vaccinated with Bacillle-Calmette-Guérin vaccine prepared at the Institute of Medical and Veterinary Science, Adelaide. Dr. D. R. W. Cowan in his report stated that all had been "Mantoux negative" before vaccination and all were "Mantoux positive" six weeks after. No severe local or general reactions followed vaccination, no suppuration occurred, and there were no glandular enlargements and no constitutional symptoms. A second human vaccination experiment had been performed recently on eighteen medical students (by request). In the absence of Dr. Cowan the vaccination had been performed by Dr. R. Motteram.

Miss Page stated that a major criticism of the Bacille-Calmette-Guérin vaccine lay in the impossibility of testing it before use for freedom from contamination with other acid-fast organisms, especially the tubercle bacillus itself. Such a test would take at least six weeks, and the vaccine should be used within ten days. If it was possible to preserve the vaccine so that it retained its viability and immunizing efficiency for a long period, then virulence tests could be completed before use.

The Russians held that, by freeze-drying the vaccine, they had stabilized it so that it could be transported to remote parts of the country and preserved for several months. The Adelaide workers hoped to attempt to dry-freeze and thus stabilize their product.

Dr. A. P. Davis (Perth) asked whether Bacille-Calmette-Guérin vaccine had been used in the treatment of tuberculosis.

Miss Page replied that its use was purely prophylactic. In reply to a question, she said that tuberculosis in the wild vole was a chronic disease; the infected vole appeared to live as long as the uninfected vole. Occasionally the vole population fell; it was not known what was the cause of this. The vole vaccine was more stable than Bacille-Calmette-Guérin vaccine, but vaccination left a scar, a fact which discouraged volunteers.

Miss M. Holmes (Melbourne) asked whether persons who had previously reacted to the Mantoux test could be vaccinated, and whether an allergic reaction would be expected if this was done.

Miss Page replied that care must be exercised in selecting volunteers; one must be certain that they were "Mantoux negative". She did not know of any vaccination of "Mantoux-positive" animals.

A Bacteriological Survey of Adelaide's Milk, Cream and Ice-Cream Supply.

Miss Joan M. Harrington (Adelaide) said that for the past eighteen months she had been engaged on a bacteriological survey of Adelaide's milk, cream and ice-cream supply. The work had been carried out at the Institute of Medical and Veterinary Science in Adelaide, and was made possible through the interest and financial assistance of the Metropolitan County Board, whose function it was to administer the *Food and Drugs Act* and the *Health Act* within the metropolitan area. The bulk of Adelaide's milk supply (about 80%) came from outside the city to pasteurizing depots; the other 20% was produced at small dairies within the metropolitan area and was mostly sold as raw milk. Most depots used the flash or high-temperature, short-time

pasteurization method, which consisted of heating the milk to at least 162° F. for fifteen to twenty seconds. Whatever the method, pasteurization appeared to be carried out satisfactorily; but contamination sometimes occurred after pasteurization.

Tests used in this survey were the methylene-blue reduction test, the coliform count, the plate count for viable organisms and the Breed smear or direct microscopic count. The value of these tests was discussed. It was found that the milk reaching the pasteurization depots was extremely poor from a bacteriological point of view. No matter how efficient the pasteurization process might be, it was undesirable to have such poor milk to deal with, as deterioration due to bacterial action had already occurred. Rapid transport and chilling might improve this state of affairs. Again, contamination after pasteurization should be avoided. Samples of cream and of ice-cream were found to fall far short of the desired level of bacteriological quality. Suggestions for the improvement of these products were outlined.

This paper was followed by a discussion of the bacteriological techniques used and of the technical difficulties involved in transport and pasteurization of milk and in the cleaning of bottles, cans and milking machines.

Dr. A. P. Davis (Perth) congratulated Miss Harrington on her illuminating paper. He said that her observations had shown that many other things were necessary besides pasteurization. The state of the dairies and the conditions of transport before and after pasteurization were all important in the delivery of good milk.

The Theoretical Problems of Moral Education.

Professor C. D. Hardie (Hobart), in his presidential address to Section *J*, said that the theoretical problems involved in moral education were of interest to the philosopher, the psychologist and the educationist. Among such problems were the following: Could ethical ideas be defined in non-ethical terms? If they could not be so defined, how did people come to have knowledge of such ideas and how did they judge the truth or falsity of ethical propositions? Was there a specifically moral emotion? What was the place of desire in moral judgement? The methods to be adopted in the practical work of moral education depended very much on the answers to questions such as these.

It seemed likely that discussion in the future would centre round two theories. The first theory was of the utilitarian type. Moral education on such a view would be in two parts, the first part consisting of intellectual instruction in the methods by which pleasure might be increased and pain diminished, and the second part consisting of drill in those habits which had been found necessary in maximizing pleasure and in minimizing pain.

The second theory was of an entirely different type. It held that moral judgements were not judgements in the scientific sense at all, but were expressions of emotional attitudes. If this was so, it was easy to see why it was so difficult to obtain agreement on moral issues, for an appeal to facts would not necessarily change emotional attitudes. Moral education on such a view would be most easily and most successfully achieved by an intensive campaign of emotional conditioning among young children.

Student Selection and the Universities.

Dr. C. Sanders, registrar of the University of Western Australia, said that at the outbreak of the second World War there were in the six Australian universities just over 14,000 students, of whom 55% were full-time students. At the present time there were about 29,000 students in the same universities, and roughly 75% were full-time students. Before the war the "wastage" rate in terms of students not proceeding to graduation was between 45% and 50% and the "wastage" rate among part-time students was up to 70% or higher. In the past it had not been the general policy of the Australian universities to restrict student entry. Originally women were excluded from the Universities of Sydney, Melbourne and Adelaide; but following the lead of the University of London in 1876, first the University of Melbourne (1879), then the University of Adelaide (1880) and the University of Sydney (1881) admitted women. Since the recent war several universities had had to employ restrictions of one sort or another, particularly in the faculty of medicine, to cope with numbers.

Conditions existing in the universities at the present time had a parallel with those following the first World War, although the enrolment problem was much less acute then than now. In 1920 the University of Sydney had enrolled 991 students in the faculty of medicine, but it did not again reach this figure until after the outbreak of the second World War. In contrast, its medical enrolment in 1928 fell to a rock-bottom figure of 362. The University of Melbourne, with rather lower numbers, showed exactly the same trends, and the same sort of thing occurred in the faculties of engineering and law.

With regard to the problem of student admission, Dr. Sanders referred to changes which had been made in recent years in the matriculation requirements of several States. All Australian universities admitted their students by examinations. In four States the school leaving examination was employed, but the Universities of Melbourne and Tasmania employed matriculation examinations conducted by the universities. Four Australian universities in the past few years had varied their matriculation requirements, including the Universities of Sydney and Western Australia, which had abandoned faculty prerequisites and established a standard matriculation for the university, while the Universities of Melbourne and Tasmania had a solid list of faculty prerequisites. The criticism was levelled against universities that their prescriptions for matriculation had a stultifying effect on secondary schools. On the other hand, universities in the past, and most of them at the present time, clung strongly to faculty prerequisites. Traditionally the classics had occupied a central position; but the tendency during the past two or three decades had been to demand, according to the faculty concerned, two or more of the following: English, a language other than English, mathematics, a physical or biological science or a social science. Recent research into the production of academic success in Australia showed, especially in regard to the first academic year, that statistics supported faculty prerequisites. Arts students without a scholastic preparation in language and social science failed to a much greater extent than others. Students of science and applied science without a scholastic preparation, particularly in mathematics, physics and chemistry, failed to a much greater extent also. It was not just a matter of intelligence. An able student, not well prepared in a specialized direction, might get through, though his lack of preparation was usually reflected in his academic performance. But an average student, not well prepared, tended to spend his first year at the university getting the groundwork that he had failed to get at school, and some at least never seemed thoroughly to master essentials at this level. It followed from this that in practice it was not the matriculation regulations that counted, but the standard set in the various first-year courses of the university. For example, in 1940 at the University of Adelaide, every full-course student who entered science and applied science faculties in that year had sat for the subjects of physics and chemistry at either the leaving or the leaving honours examinations. Yet these subjects had received no specific mention in the prescriptions for matriculation into the university. Just as secondary education depended on the acquired skills and achievements at the primary level, so tertiary education depended on the acquired skill and achievements at both levels. The standard of the university must influence this teaching in secondary schools.

The usual alternative to university entrance examinations was accrediting for matriculation. This had been widely employed in the United States for many years, and a partial accrediting system had been used in Melbourne up to the year 1944. New Zealand was now experimenting with accrediting along Victorian lines, though these had been discarded in Victoria for a new matriculation examination. Dr. Sanders said that he himself was in favour of increased accrediting at the secondary school level; but it was not possible yet to support the view by statistical analysis of conditions in Australia. When the problem of secondary school and university courses could be tackled as a whole, he would be more hopeful about accrediting for matriculation in Australia.

Psychological tests had been proposed as another alternative means of student selection. From information so far available, entrance examinations had shown a higher correlation with university examinations than with intelligence test scores. University student populations, on the evidence of Australian studies up to the present, were fairly highly selected in point of intelligence. The Australian Council of Educational Research in 1943 found that entering students at the University of Melbourne in that year had a mean intelligence quotient of approximately 124, and that 90% had an intelligence quotient above 115. The group was selected, as this was a war year. Dr. Sanders anticipated that at the present time the mean on the same test would be about 120.

In conclusion, Dr. Sanders mentioned the ex-service students who had been admitted to the University of Western Australia in 1946. Recently a comparative analysis of the success of those who were enrolled in first year had been made, and on balance the ex-service students, who on an average were four years older, did better than the

civilians. In the main their success seemed to be due to a clearer perception of ends and means, as well as to a thoroughgoing determination to get through and make up for the years lost to them by the war. The ex-service students had entered the university on very much lower qualifications than the civilians. The point Dr. Sanders wished to emphasize was that attributes of character, as well as inborn abilities and scholastic aptitudes, were important determiners of academic success.

An Ego-Age Profile.

R. G. Staines (Perth) discussed the ego-age profile. He asked whether, if no two thumbprints were alike, there was any chance that two whole personalities would be alike. The odds were infinitely against it, for individuals differed from one another in respect of a multitude of different qualities. If it was possible to plot a person's score, relative to that of others, for each of these innumerable qualities, one would have his profile; or if one could determine how far, for each quality, in terms of years and months, he had progressed toward maturity, one would have his personality or ego-age profile. Such a profile, depicting the individual's degree of maturity in all the strands of his make-up, was the goal of every investigator of individual personalities. But was it ever likely to be achieved?

The analysis of whether an ego-age profile could ever be achieved involved the breaking of the ego into the four separate elements from which it was compounded. These were the ego-idea or the notion of self, the ego-attitude or the person's emotional attitude to himself and those whom he knew well, the ego-action-tendencies and the ego-goals or those objectives to which he devoted himself. Mr. Staines wondered whether it was possible to discover a general trend towards maturation in each of these four phases of the total ego, and, after measuring this in age units, to construct an ego-age profile.

Mr. Staines then made a theoretical attempt to set out the items or qualities which, for each of the four phases of the ego, might make the separate strands for the ego-age profile. He examined the way in which the child's idea of "self" or "I" grew from his awareness of his body, his possessions, his in-groups, his habits and his skills, to a more mature awareness of some of his abstract qualities, like his honesty or dishonesty, his sense of justice or tolerance and his belief in his political liberalism, conservatism or radicalism. This attempt investigated the nature of insecurity and the inferiority complex and discussed the way in which inferiorities were ironed out as ego-maturity was approached. It treated of the conflict or urges within the individual and indicated how the dictates of ego-principles should ultimately override other ego-impulses. And it suggested that as a person's goals matured, he devoted himself more and more to a single all-inclusive life goal. Implied in it also was the conviction that educators could and should set out to develop mature egos and should count so doing a more important task than the drilling and drumming of facts into the mind of the pupil. Finally, it urged that research workers should concentrate their study on ego-development, so that people would know how to develop egos socially mature enough for the advanced technological society which each individual must assist to control.

The Terman Class.

Mr. A. R. Morrison (Perth) discussed the Terman class. He said that it was a class for gifted children or for highly intelligent students—a class wherein the instruction was biased towards leadership. The eminent psychologist Professor Terman had defined intelligence as the power of abstract thinking and he was largely responsible for the technique involved in the specific type of instruction instrumental to teaching both those who possessed superior intelligence and those of low-grade mentality. Leadership was essential in a democracy; but who were the leaders? And how had they prepared or qualified for the positions they held? Leadership required the four "I's"—intelligence, integrity, independence and initiative. There were other desirable qualities such as vitality and stability, but these were not so important in connexion with education.

If the gifted child was likely to annoy society, more attention should be paid to him. Money was found for delinquents and for the feeble-minded; but society's most valuable resources were neglected or at least did not receive the special attention they required. Highly intelligent children were more stable emotionally than children in general, but often showed a restlessness and a lack of interest which quickly degenerated into boredom. If the gifted child was not recognized, he soon worked below his capacity and developed habits of idleness and day-dreaming. A Terman class attempted to secure right habits of work for the highly intelligent child. Such a child was likely to be versatile and was often interested in too many things ever to accomplish much in any of them. His problem was to make a definite choice. Children with intelligence quotients above 160 tended to become solitary and had difficulties in forming friendships. The more intelligent the child, the less often could he find a congenial companion. Then followed the substitution of make-believe mates and imaginary companions. Interest in reading might further isolation. Such children should make and do things rather than just read. The development of physical, social and emotional aspects of personality should have first attention. Intellectual aspects could be fostered last of all, because they came of themselves. Teachers of a vital, energetic and enthusiastic type were needed. The aim was not acceleration, but to give scope to ability above the average by an enrichment of the curriculum. In the eastern States, for some years attention had been given to special training for gifted children. The development of these classes in Western Australia had been helped by the interest in the scheme shown by Mr. E. A. Coleman and Professor R. G. Cameron. Music and elocutionary talent were fostered. Care was taken to guard against anything of the nature of educational snobbery. There were difficulties in the scheme, but it had nonetheless achieved considerable success.

The Soils and Agriculture of the Waimea County, Nelson, New Zealand.

Sir Theodore Rigg (New Zealand), in his presidential address to Section *K*, said that the Waimea County, Nelson, New Zealand, was noted for its sheltered position, abundant sunshine and equable climatic conditions, which favoured the development of fruit, tobacco and market-garden crops. The soils of the county were remarkable for their diversity and their varying fertility status. Igneous rocks of both basic and acidic types, and the occurrence of different sedimentary deposits, greatly influenced the characteristic properties of soils in different parts of the county. Many soils were associated with marked deficiencies of lime and phosphate, while trace element deficiencies of cobalt, boron and magnesium had been identified in particular soils.

Agriculture in Waimea County was unique by reason of the location within the county of the entire hop and tobacco industries of New Zealand. An apple industry, tomato culture and the growing of small fruits and canning crops were important features of Nelson agriculture. The alluvial soils of the county were used mainly for dairying and for intensive crops, while the very large area of poor hill land in the county was used for sheep farming. A recent development in the utilization of the poorer soils in the county had been the planting with *Pinus insignis* of some 50,000 acres of the Moutere Hill country. Over two-thirds of the gross annual value of agricultural production in the county was derived from intensive crops such as tobacco, fruit, hops and tomatoes grown on some 9000 acres of soil. Further development of agriculture in the Nelson district was dependent on the conservation of valuable alluvial soils, on the extension of the tobacco, fruit, hop and market-garden industries, and on the utilization of much poor land for forestry.

The Development of North-West Australia.

A joint meeting of Sections *C*, *G*, *H*, *K* and *P*, on the development of north-west Australia, took the form of a symposium.

W. H. Maze, deputy registrar at the University of Sydney and former lecturer in geography, said that, taking the Ord River valley as a fair sample of the agricultural potentialities of the north-west, he considered that the north could not make any additional major contribution to the agricultural resources and settlement of Australia. If 100,000 acres could be irrigated in the Ord valley, the maximum possible increase which would result would amount to no more than 6000 persons. Estimates of a similar order could be applied in the Fitzroy, Daly, Victoria and Roper valleys. Thus settlements based on irrigation in these valleys would probably support an agricultural population in the north and north-west of only 50,000 persons. The fundamental limiting factor in the cattle industry was that, under natural grazing conditions, the stock experienced a starvation period of varying intensity each year. To improve the quality of the beef, the feed must be supplemented for the latter end of each dry season. Extensive areas were not grazed at all, and still larger areas were grazed for short periods only. Grassland deterioration had occurred, and on the water frontages there was complete destruction of all pastures. Provision of better roads, the building of a railway and more fencing would help the marketing of cattle. Remarkable results had been achieved by the efficient management of a few smaller stations. Better management

and better transport facilities could produce better quality beef. But better management could not completely overcome the fundamental limiting factor of the annual dry-season "starving period"; supplementary feeding was the one possible solution.

This might be supplied by small irrigation projects of several hundred acres, one at least on each large station.

In a number of lecturettes and the discussion which followed Mr. Maze's paper many constructive suggestions for the development of the north were made.

F. Forman spoke about the geology of the Kimberley area and stressed the need for more field work.

Dr. C. Teichert said there was an obvious need for closer cooperation between the soil scientist and the geologist.

A. M. Stewart said that it was not to be assumed that all Europeans were not adapted to the hot climate of the north, but some were more adapted to it than others.

C. S. Christian, principal research officer in the division of plant indnstry of the Council for Scientific and Industrial Research, said that the trend of development of the cattle industry must be towards making the north-west as self-contained as possible.

M. Henry (New South Wales) said that overhead costs due to cattle diseases in the north were extremely high. With the possibility of an increased cattle population, the north was a possible danger source of disease to the south. Very little was known about some of these diseases, and immediate investigation was called for.

W. M. Telfer said that before Queensland was settled it had been deprecated as a white man's grave; but settlement had followed and white people flourished in the climate. On the coast between Broome and Darwin there was a heavy rise and fall in the tide, and the development of tidal power could be seriously considered.

Dr. H. G. Raggatt (Canberra) said that three large companies were pooling their resources for an oil survey of the north.

Professor J. Macdonald Holmes (Sydney) said that Australia had not yet made adequate experiments at putting in amenities first and dealing fully with soil surveys and contemporaneous work afterwards. Referring to the flying doctor service, he said that no person in the centre of Australia was more than two hours from a doctor; but the trouble was that there were too many doctors in St. George's Terrace and too few in the north.

E. H. B. Lefroy said that the greatest difficulty confronting the pastoral industry was the shortage of suitable white labour. If the right types of white settlers were wanted, they would have to be given the inducement of amenities comparable with those of the south. He knew from observation that the contention was wrong that white children could not be reared in the northern areas.

Another speaker stressed the need for an entomological survey for tropical disease control in regard to a potential white population in the north.

Two recommendations came from the meeting. The first emphasized the need for expanding veterinary research into conditions affecting livestock in the northern areas of Western Australia and the rest of northern Australia. The second stressed the urgent need for an improvement of amenities in the north-west and recommended that an amenities and sociological survey be instituted in the Kimberleys and Northern Territory regions, especially in relation to the work of the regional planning division of the Commonwealth.

Infertility of Ewes.

At a joint session of Sections *I, L, K* and *N*, Dr. H. W. Bennetts (Perth) reviewed the problem of sheep infertility on subterranean clover pastures. He said that the problem was of great interest to many branches of science and had even captured the public imagination. It seemed unlikely that an easy practical solution would be found. The breeding problem in sheep maintained on dominant subterranean clover pastures manifested itself in three ways—prolapse, dystocia and female infertility. It was believed that these abnormalities resulted from the continued ingestion of an œstrogenic substance contained in the clover. There appeared to be only two possible ways of control—a system of farm management designed to lower the intake of clover to safe levels, and the elucidation and modification of the genetic or environmental factors, if any, governing the production of the œstrogenic substance in the clover plant.

A. B. Beck described methods used for the preparation of clover extracts.

Professor E. J. Underwood (Perth) said that the absence of a scientific solution to the problem made it imperative to consider just what the farmer should do. All the present evidence indicated that ewes, once affected, were permanently affected. The entire male was unaffected by the clover pastures, which suggested that its own androgens provided a protection from the œstrogen taken in from the pasture. The farmer could not eliminate his clover. All field and laboratory evidence supported the view that it was the subterranean clover, especially the "Dwalganup" strain, which supplied the œstrogenic substance that caused the breeding trouble. But subterranean clover (with superphosphate) was the most important single factor in increasing the carrying capacity and raising the soil fertility of the whole of the affected areas. Possible solutions for the farmer were sheep raising based on purchased stock, beef production, and modified farming systems involving the development of better balanced pastures and regular pasture-cereal crop rotations; or a breeding programme based on the regular purchase of ewes from "sound" areas could be adopted. The ewes would breed normally for the first season after they had been transferred to affected properties. Another possibility was the development of "baby beef" in clover areas. Cattle were not affected by the breeding trouble (even on the most clover-dominant pastures). The extreme dominance of the subterranean clover in the affected pastures was believed to be contributed to not only by the extreme adaptability of the plant to this environment, but by consistent overstocking and in the war years by too little superphosphate. Experiments were being carried out on the effect of different pastures on the breeding troubles. The results were encouraging, but that was all.

Physiological Experiments on Marsupials.

In his presidential address to Section *N*, Dr. A. Bolliger (Sydney) sought to demonstrate the usefulness of marsupials in the teaching of, and research in, physiology in general.

Dr. Bolliger said that the skin of *Trichosurus vulpecula* and other phalangeridæ was covered with a blue fluorescent secretion which had not yet been observed in other mammals. This coating might be a protection against sunburn. With the aid of female sex hormone the scrotum of the castrated male possum could be inverted to form a typical pouch. The pouch of the spayed female treated with testosterone everted to form a rudimentary bifid scrotum. Thus pouch and scrotum were proven to be homologous. A pair of fairly large glands of a sebaceous nature situated above the cloaca did not liquefy its secretion, and the secreted cells were met with in the urine. Surgical removal of these glands might bring on sterility in the male. In some male marsupials the sebaceous and sudoriferous skin glands of the sternal region were about twenty times as large as those seen elsewhere in the skin and were very active. The overlying hairs were of different nature and of darker colour than those of the surrounding fur. These characteristics were much less marked in the female. Castration of males and females at an early age prevented this area from developing. Administration of testosterone to normal females and to castrated males and females resulted in the formation of a sternal area of the male type. Crystals of urates were encountered in the ducts and walls of the sudoriferous glands of the sternal area. The uric acid content of the fur was found to vary in different regions. The normal male exhibited persistent physiological spermatorrhœa, and the status of spermatogenesis could be ascertained by examining a drop of urine. In contrast to the ordinary laboratory animal, the common and the ring-tailed possums were readily infected with kala-azar disease. In addition they developed nervous and ocular lesions usually not observed in other mammals. These findings indicated that the marsupial might furnish a new or simplified approach to certain problems of physiology or pathology.

Carbohydrate Metabolism in Nematode Parasites.

Dr. W. P. Rogers (Sydney) discussed carbohydrate metabolism in nematode parasites. He said that the breakdown of glycogen in certain adult nematode parasites was accompanied by the formation of carbon dioxide and lower fatty acids. The route of glycolysis and related phosphorus metabolism was discussed, with brief reference to aerobic and anaerobic pyruvate catabolism.

Factors Influencing the Energy Metabolism of Ruminants.

E. W. L. Lines (Division of Biochemistry and General Nutrition of the Council for Scientific and Industrial Research) described the metabolism, energy and protein balances of 25 groups of ewes, fed on diets composed of varying mixtures of wheat, lucerne, wheaten straw, cellulose and protein concentrate, which had been measured in the zone of thermal neutrality and at rest. These data had been analysed to obtain estimates of the heat increment of each of these fodders, of the energy requirement for maintenance, and of the energy cost of forming or using fat. Five factors

had been found to contribute to the fat metabolism of the ruminant: (i) body weight, (ii) non-protein nutrients catabolized, (iii) protein catabolized, (iv) fat formed or lost, (v) a "cost of digestion". The estimated parameters for computing the contribution of these factors to the observed metabolism were described. The correlation between the metabolism computed in this way and the observed metabolism was approximately +0·95, whether the differences or the differences of the logarithms were used for the computation. Mr. Lines also described the observed and computed metabolism of (i) 24 independent groups of ewes fed diets of grass hay, of oil cake, or of other grains, and (ii) 29 American observations on steers and cows. In each case a similar degree of correlation had been observed. The heat increments of fodders computed in this way were independent of the nutritive state of the animals and were based only on protein content, digestibility and methane production. The estimates of maintenance requirement in terms of body weight and of the cost of making or burning body fat afforded a basis for determining the heat increment of a fodder for which sufficient data were available. These data were not applicable to field conditions without correction for activity and meteoric conditions.

Recent Advances in Methods for the Control of Shock.

H. Kretschmar (Perth), speaking at a combined meeting of Sections *I* and *N*, discussed the mechanisms involved in the development of the shock syndrome. It was emphasized that the outstanding feature of this syndrome was an underfilled vascular system, better described as a discrepancy between the capacity of the vascular bed and the volume of blood in circulation, since neurogenic shock was due to an increase in the capacity of the vascular bed caused by vasodilatation. The various conditions which might produce shock by the loss of whole blood, of blood plasma or of electrolytes were enumerated.

Blood volume deficiencies should be corrected as soon as possible, since it had been shown that a deficiency insufficient to cause a fall in blood pressure might cause a profound decrease in blood flow in certain areas of the body, with resultant important pathological changes.

The purpose of biochemical investigations was to distinguish between the losses which might have occurred, firstly, in order to enable one to administer the appropriate therapy and, secondly, in some cases at least, to differentiate between possible causes. The development of the biochemical methods used was discussed briefly. Mr. Kretschmar showed, using his own analyses and analyses of blood published in the literature, that a chart devised by him for the interpretation of blood analyses fitted a wide variety of conditions in which the nature of the fluid loss was known. The accuracy of the chart having been established, it might be extended to cases in which the nature of the loss was problematical. The nature of the most suitable fluid for infusion was discussed at some length.

Dr. C. Fortune (Perth) thanked Mr. Kretschmar for his paper and said that the chart described had already proved to be of great use.

Dr. A. Bolliger (Sydney) said that he had noticed that the physiological fluid described by Mr. Kretschmar did not contain potassium.

Mr. Kretschmar, in reply, said that in general there was a slight increase in the potassium content of the plasma in these cases, as there was an "intracellular to plasma" movement. In actual clinical trials it had been undesirable to include potassium in fluid for intravenous administration. He quoted the experience of Bywaters during the bombing of London.

Dr. D. J. Monk Adams (Sydney) said it had been demonstrated that massive doses of sodium in the form of hypertonic saline solution were of definite value in some cases in the treatment of shock. This was probably not a mere substitution.

Mr. Kretschmar, in reply, said that the giving of saline solution intravenously was of value when continuous drainage of gastric juice or prolonged vomiting had been present; but in other conditions one might end with a worse condition than that with which one had started, since diuresis occurred in order to get rid of the excess of sodium chloride. In cholera it was essential to add sodium bicarbonate to the transfused fluid, and in later stages injections of calcium gluconate were necessary to overcome tetany.

C. J. Pope (Perth) asked Mr. Kretschmar whether he had had any experience of the estimation of protein by the copper sulphate method employed by the United States army.

Mr. Kretschmar said that he had had experience of this method, but where laboratory facilities were available, he preferred Barbour and Hamilton's falling drop method.

Professor F. S. Cotton (Sydney) said that he had had experience of the Barbour and Hamilton method. He asked Mr. Kretschmar whether he had ever found that the drops fell and then slowly rose again.

Mr. Kretschmar said that he had not seen this happen. He had used some of the original solution used by the Americans themselves. Professor Cotton's experience sounded as though the drop had been diluted by some constituent of the surrounding fluid.

Professor Cotton said that he thought Mr. Kretschmar's chart should be extremely useful and that it opened up a whole field of possibilities.

On the Behaviour of Skin Temperature with Special Reference to Chilblains.

G. M. Kellerman (Sydney), at a combined meeting of Sections *I* and *N*, discussed the behaviour of skin temperature with special reference to chilblains. After a brief summary of the available literature, during which the multiplicity of apparent causes of chilblains was emphasized, the thermocouple recording system and mode of selection of subjects were described. Investigations had been made on the central nervous and local vascular reactions to cooling of the atmosphere, effects being judged by the point at which the hands (or feet) just managed to keep warm or to warm up after being cooled. Evidence was presented to show that in chilblain sufferers there was a heightened response to atmospheric cooling, the hands cooling down when the temperature of the air was about 2° C. above that necessary to produce a response in the non-sufferers. A significant effect of local cooling had been obtained only in the chilblain subjects. The effects of exercise had been examined and moderately severe exercise for five minutes was found to warm up the hands if these were cold, providing the air was above a given temperature. No significant difference was found between the groups in this respect. No differences were found in the behaviour of the forehead and chest temperatures in those who did and those who did not suffer from chilblains; but the ears warmed up far more readily in the chilblain subjects after exercise.

P. I. Korner (Sydney) asked how the critical temperature (the temperature necessary to produce skin cooling) was actually related to chilblains.

Mr. Kellerman said that there appeared to be a large overlap. A high critical temperature was not necessary, a low one was not a safeguard. A high critical temperature was probably a predisposing cause, on which other factors (for instance, dietary deficiency or removal to a colder climate) might operate. Chilblains were probably due to a combination of factors. Calcium deficiency was certainly not the only cause.

Professor F. S. Cotton (Sydney) asked whether there were any age limits for the occurrence of chilblains or any recognized period at which they were more prevalent. Babies did not get chilblains. Had war conditions affected the occurrence of chilblains? Were they more common in women during the war years, when they had not worn stockings?

Mr. Kellerman said that he himself had suffered from chilblains since he was three years old. It had been stated that 90% of affected persons had ceased to suffer from chilblains by the time they were twenty years of age. Some people got them after returning from the tropics, where they had been free from chilblains. In this as in other ways Australians were more susceptible to cold than persons living in England or America. Mr. Kellerman did not know whether the absence of stockings had contributed to the prevalence of chilblains. There was a condition common in women which resembled a giant chilblain on the edge of the shin.

H. Kretschmar (Perth) observed that one of the greatest difficulties in the work described was the obtaining of a true skin temperature, as one had a poorly conducting source of heat in the skin and a good one in the thermocouple itself. Mr. Kellerman said that the work had been done with thermocouples using 40-gauge wire. Metals with low conductivity had been chosen, and the junction at the end soldered with silver solder. The thermocouple had been fastened to the skin with collodion. It had been found that the temperatures obtained were the same as if the thermocouple was inserted into a small hole made in the *stratum corneum* by a hypodermic needle.

Professor A. N. Burkitt (Sydney) said that neither the Eskimo nor the Australian aboriginal suffered from chilblains and that chilblains were far more common in England than on the Continent. A possible factor was that people took far more precautions in colder climates because of the danger of frost-bite. Eskimos wrapped up more warmly than any other people in the world.

Mr. Kellerman said that he had no theories to advance about the absence of chilblains in the Australian aboriginal. Possibly exercise played a part, as long treks for food were necessary. There might be constitutional factors. There was no record of the lower animals having suffered from chilblains.

A speaker asked whether chilblains were in fact caused by sudden changes in temperature.

Mr. Kellerman said it appeared that chilblains could not be easily produced by sudden changes in temperature. Referring to the common idea that chilblains could be caused by sitting in front of a fire, he said that it was possible that radiant heat from the fire damaged the superficial tissues in a way that was comparable with an actual burn. Sudden, quick changes—for instance, rubbing the hands in ice and then plunging them into warm water—did not seem to produce chilblains.

Dr. A. Bolliger (Sydney) asked whether histamine production was related to the occurrence of chilblains.

Mr. Kellerman said that he had read that if a solution of histamine was injected into chilblains, they itched for a few hours and then cleared up altogether. He had tried to repeat this experiment, but without success. He doubted whether histamine production played a part, because the itching of chilblains occurred only when the hands became warm.

A Semi-Automatic Method for the Determination of Blood Pressure in Man, and its Applications.

P. I. Korner (Sydney) described a modification of the standard auscultatory method for the determination of blood pressure, enabling continuous blood pressure recordings to be made. The apparatus was suitable for recording either systolic or diastolic pressure, readings being obtained at three to four millimetre intervals in the case of the former and eight to ten millimetre intervals in the case of the latter.

The effect of graded sprint exercise (on a bicycle ergometer) on the post-exercise blood pressure curve was examined, certain new features were described and quantitative relations were established. Instantaneous heart notes were examined in conjunction with the blood pressure. The portions of the post-exercise systolic curves included: (i) a period immediately following exercise in which blood pooled chiefly in the vascular bed of the legs; (ii) a period of general vasoconstriction culminating in a rise to a maximum, the absolute rise in pressure being proportional to the work done; (iii) a decline in the systolic blood pressure in three or four abrupt steps following the maximum rather than an oblique descent. The changes in blood pressure following exercise were reflected to a greater degree in the systolic than in the diastolic pressure. Methods of adducing the part played by the active leg muscles included prevention of recovery in them by occlusion with a pressure suit at various stages.

Professor F. S. Cotton (Sydney) emphasized the fact that there were about 200 readings in each experiment against the 20 of Leur *et alii*. He asked for a description of the kymograph tracing.

Mr. Korner drew a diagram of this tracing on the blackboard.

Dr. D. J. Monk Adams (Sydney) asked whether the nervous impulses from the legs were responsible for the general vasoconstriction.

Mr. Korner agreed that that was so and drew attention to evidence presented previously in his paper, but said that the pathways were as yet unknown.

Dr. Cohn spoke of exercise tolerance tests in which the return to normal of pulse pressure was used as a criterion of physical fitness.

Mr. Korner said that pulse pressure data were unreliable. The systolic pressure appeared to be more fundamental in the gauging of the type of vasomotor response. In those subjects for whom the exercise proved too violent, decompensation occurred one or two minutes after exercise, during the period of "step decline".

The Relationship between Dosage of Muscular Exercise and Improvement in Performance.

Professor F. S. Cotton (Sydney) said that the object of the research described in his paper was to obtain some answer to the question: "How much improvement in performance may arise from the administration of prescribed doses of muscular work?" At the outset it was considered advisable to choose a recurring dose of work, almost as small as possible, consistent with a good prospect of yielding a really significant improvement. For various reasons discussed, the type of exercise chosen was work on a stationary bicycle, so constructed as to make an accurate ergometer, with an error not exceeding 1%. The duration of each dose of exercise was thirty seconds, and the subject was pressed to perform to his maximum on each occasion. In each case the subject was required to exercise twice only per week, except in so far as he might have to skip an occasion when indisposed. Thus the maximum amount of training for each subject was one minute per week. It was necessary to eliminate any fallacious improvement, due for example to any progressive change in speed of movement. Thus it was arranged to maintain constancy of speed of leg movement for each individual in accordance with his initial performance. Furthermore, no subject was chosen who had access to the use of a bicycle during the course of the experiment, although all had had previous experience of bicycle riding. The chief results were then given. In the case of some 26 men who continued for some eight weeks, the mean performance increased from 369 footpounds per second to 432 footpounds per second, an improvement of 18% for a total of eight minutes' work. In the case of the group of 13 women, the mean performance increased from 232 footpounds per second to 292 footpounds per second, an approximate improvement of 26% for a total of eight minutes' work. Contrary to expectation, in the case of both the men and the women, the most outstanding improvement, both absolute and relative, occurred with those subjects who stood at or very near the top of the performances at the start.

Physical Methods in Biological Research.

At a combined meeting of Sections *I* and *N*, a paper by H. F. Holden (Melbourne) described the giant strides that had been made during the past thirty years in biological applications of physics and physical chemistry, and also forecasted some probable developments in the future.

As Mr. Holden was absent from Australia, his paper was read by Dr. Cyril Fortune (Perth). He stated that in the measurement of the concentration of hydrogen ions, a procedure of fundamental importance, the use of the glass electrode had meant a great advance. Again, the exact choice and control of temperature had made notable advances, well illustrated by the modern Warburg respirometer. Improvements in refrigeration had also brought great benefits to biological research. Many chemical reactions could be profitably undertaken in a cold room or well-refrigerated apparatus. The use of powerful gravitational fields by high-speed centrifugation had rendered possible the separation of substances in small or large quantities whose densities differed but slightly. Two other types of modern electrical equipment were those for the determination of conductivity and for the production of mechanical vibrations of ultrasonic frequencies. Mr. Holden also mentioned modern X-ray equipment, X-ray crystal analysis and the electrocardiograph. He stated that he himself had made little use of serious microscopy in his studies, but he reminded his audience that in modern microscopes human ingenuity had nearly approached the theoretical limits of possibility. Recent years had seen the development of dark-ground illumination, fluorescence microscopy, chemical and analytical microscopy, ultra-violet and finally electron microscopy.

Electrophoretic analysis was another recent development in physical biology. Another physical method which had been and would be most fruitful of helpful information was that of adsorption, especially in its special form of chromatography. Again, the practice of spectroscopy in biological research had progressed by leaps and bounds in recent years. The most recent developments were the universal photoelectric spectrophotometer, covering from 2000 to 20,000 Ångström units in one instrument, and the sumptuous recording spectrophotometer.

Turning to the years ahead, Mr. Holden quoted the words of Winston Churchill that the purpose of the study of history was the enforcement of vigorous action in the future. An intensification of all the present lines of activity seemed indicated. More sensitive methods were needed in the field of electrophoretic and ultracentrifugal analysis.

Mr. Holden concluded with some constructive suggestions. He said that while Australian biological scientists (in the widest sense of biology) were not sumptuously equipped with physical gear, there were fairly widespread facilities which were not to be despised. He stressed the need for mastery; only in so far as a man was complete master of each piece of his apparatus could he justly place reliance on the data thus provided. It seemed to him that time was well spent, especially in the evening and at week-ends, on the design and construction of simple pieces of physical apparatus in connexion with one's own work. Such work strengthened one's grip on the fundamental principles involved, increased

one's powers of discernment and undoubtedly was most wholesome to body and mind. The latter was invited to think in comfort while the hands were occupied, and the gentle exercise satisfied the needs of the body and improved the digestion, a reform of which many scientists stood in need. The second point was that biological scientists should care for their apparatus. Had they possessed in 1940 the microscope and oil immersion lenses ruined through neglect in the last score of years, there would have been no shortage of such precious instruments. He had seen a delicate £150 analytical balance in close proximity to a briskly boiling oil-bath, piles of tobacco ashes surrounding delicate balances and precision optical equipment, finger marks on interferometer compensation plates, optical slits wrecked by brutality, battery clips used to transmit a "steady" current from an accumulator, salt solutions spilt on precision electrical measuring instruments, silver surfaced mirrors left for long periods exposed to atmospheric corrosion, optical cells and plungers put away uncleaned. On this subject he could run on like Tennyson's brook. Well-cared-for apparatus showed its grateful appreciation by greeting the advancing user with a friendly gleam of well-polished woodwork, brightly shining glass and clean paint and metal. Smeared cabinets and bleary glass and tarnished metal made equipment as attractive as a filthy child at a tea-party, and about as useful. In every course in universities and technical colleges proper tuition reinforced by the most savage discipline should be directed towards the proper use, cleaning and care of all apparatus employed.

Mr. Holden's third constructive suggestion was made with the utmost diffidence. He said that a great deal of equipment consisted of a large number of simple parts with a few special parts; the latter were procurable from overseas firms, which made a business of their production. The suggestion was that the simple parts could be made in Australia while only the more intricate parts were obtained from abroad. Mr. Holden's address was illustrated by a series of lantern slides showing some modern physical equipment.

Dietary Influences on Carbohydrate Metabolism in Experimental Diabetes.

Dr. D. J. Monk Adams (Sydney) said that it had been repeatedly shown that if normal animals were fed on a carbohydrate-rich diet they became increasingly sensitive to injected insulin and developed improved glucose tolerance curves, and the insulin content of the pancreas was increased. Opposite changes occurred if a diet poor in carbohydrate was given. It had been assumed that these changes were directly due to variations in the level of the blood sugar which such diets brought about. Dr. Monk Adams described experiments conducted to find out whether it might not be the amount of circulating insulin that was the controlling factor. The following method was used. Rabbits were made diabetic by intravenous injection of alloxan. They were placed on diets rich and poor in carbohydrate for one month, during which time they were given the same daily dose of protamine zinc insulin. Insulin sensitivity and glucose tolerance tests were then conducted on different animals. The dietary was then reversed to the opposite type and so continued for a month, and the tests were then repeated at weekly intervals, so that results would be comparable. Great differences were present in the insulin sensitivity of an animal owing to the change of diet, and thus the blood insulin level, which was the same for both types of diet, was not responsible for the changes in insulin sensitivity. All the glucose tolerance curves of the diabetic animals were abnormal, although the fasting blood sugar contents were normal. Thus it could be postulated that the normal glucose tolerance curve was dependent upon the lability of the secretion of insulin from the pancreas.

The Influence of Heparin on the Toxicity of Australian Snake Venoms.

Professor E. R. Trethewie (Adelaide) and A. J. Day (Adelaide) described an attempt to determine the influence of heparin on the toxicity and on the action of two Australian snake venoms, namely, those of *Notechis scutatus* (Australian tiger snake) and *Pseudechis porphyriacus* (Australian black snake). This had been done because of the known coagulant action of these venoms. The toxicity of tiger snake venom for guinea-pigs and of black snake venom for mice was determined approximately. The subcutaneous administration of heparin lengthened the death times of animals injected with tiger snake venom and with black snake venom. No effect on the mortality was observed. The mechanism of action of the two snake venoms was considered in the light of these findings, and a possible clinical application in the treatment of snake bite was discussed.

Observations on the Iso-Agglutinin Content of Cord Blood.

Dr. R. Jakobowicz (Melbourne) described the examination for iso-agglutinins of 355 samples of cord blood. In the majority of cases she had not found in the cord blood any agglutinins which were antagonistic to mother or child. In 355 samples only five exceptions were found; of these, four contained agglutinins antagonistic to the child's blood group, but corresponding to the maternal group; these might be acquired antibodies. One sample contained an antibody antagonistic to the mother's group, but corresponding to the child's group. The agglutinins found in the cord blood seemed to be of maternal origin, but their presence could not be explained by simple passive filtration. In the exchange of maternal and fœtal blood there must be a process which caused selective retention of maternal antibodies.

Conclusion.

The congress closed with a meeting of the general council of the association on the morning of Wednesday, August 7. At this, the first meeting held in Perth since 1926, membership of the congress constituted a record for Australia. With an enrolment of over 1450 the attendance exceeded by at least ten members the largest of any meeting held in the capital cities of the eastern States. At the council meeting votes of thanks were passed to the Government of Western Australia and to the many persons and associations who had helped to make the Perth congress an outstanding success.

British Medical Association News.

SCIENTIFIC.

A MEETING of the Victorian Branch of the British Medical Association was held in conjunction with the Alfred Hospital Clinical Society at the Alfred Hospital, Commercial Road, Prahran, on Wednesday, May 21, 1947. The meeting took the form of a series of clinical demonstrations by members of the medical staff of the Alfred Hospital and of the associated clinical society. Part of this report appeared in the issue of October 11, 1947.

Carcinoma with Unusual Features.

DR. DONALD DUFFY showed two patients with malignant disease which presented unusual clinical features. The first was a male, aged seventy-two years, who had been admitted to hospital, having passed blood in his urine two days previously. On the day of admission he had had a dull pain in his right loin and vomited several times. Examination revealed the presence of a mass in the right flank which could not be distinguished from a downward projection of the right lobe of the liver. The mass appeared to have an edge, it moved with respiration and could not be balloted in the loin. Numerous red cells were present in the urine. An X-ray examination of the region had disclosed a large calcified area, very suggestive of a degenerating hydatid cyst, situated posteriorly in the right lobe of the liver. However, the results of Casoni and hydatid complement fixation tests were both negative. By means of excretion and retrograde pyelography a definite deformity was revealed in the middle and lower calyces of the right kidney, suggestive of renal neoplasm. This had been confirmed at operation when Dr. Harry Phillips removed a kidney from the anterior surface of which projected a large calcified cyst, about two and a half inches in diameter. The cyst contained purulent granular material and was closely associated with a neoplasm which had infiltrated the pelvis and replaced the medulla and portion of the cortex of the organ. The histological characters were those of a clear-celled papillary adenocarcinoma. An X-ray examination after operation had shown that the calcified mass had been removed.

Dr. Duffy's second patient was a male, aged thirty-two years, who had complained of increasing breathlessness, cough and weakness for nine months. Sixteen years previously his appendix had been removed and the wound drained after operation. In September, 1946, he had noticed a pain across his chest, which was aggravated by coughing or deep breathing. He had had an unproductive cough, which caused him slight pain at the site of his operation scar and had done so ever since. In November he had noticed an increasing breathlessness on exertion and had attacks of flatulence. He was unable to work and was admitted to a country hospital in February, where an X-ray

examination of his chest resulted in an investigation for tuberculosis; later penicillin was administered. At that time he had noticed a pain in hs right hip, which was aggravated by movement. Since February he had become increasingly breathless, so that even turning in bed made him gasp for breath. He had lost a stone in weight, had no desire for food, and felt very weak. He had always suffered from constipation, but recently it had become more troublesome. The striking feature on inspection was the orthopnœa and the absence of cyanosis. Examination of the lungs had revealed no sign of consolidation, but the breath sounds were poorly conducted on both sides, and there were a few rales in the left mid-zone posteriorly. In the abdomen a hard, immobile, tender mass could be felt beneath the appendicectomy scar in the right iliac fossa, while in the subcutaneous tissues directly over the mass was a hard pea-like nodule. X-ray examination of the lungs disclosed an extensive bilateral infiltration, which the radiologist considered most like tuberculosis, but he could not exclude the possibility of sarcoidosis or metastatic deposits. X-ray examination following a barium enema and follow-through meal showed obstruction in the caecum and ascending colon, the appearances being fairly characteristic of a neoplasm. A biopsy of the nodule in the abdominal wall was next performed. A calcified piece of tissue was removed, which on section showed the characters of a mucoid adenocarcinoma with considerable bone formation. Dr. Duffy pointed out that the prominence of the pulmonary symptoms due to metastases from a primary carcinoma of the caecum was most unusual. The peculiar lung infiltration demonstrated radiologically suggested a spread by the blood stream.

Treatment of Refractory Anæmia.

DR. JOHN MCLEAN showed three patients with refractory anæmia who had been given direct blood transfusion. One patient, a male, aged forty-nine years, was first seen in June, 1939. He had become very weak and short of breath, and a blood examination showed severe anæmia. The hæmoglobin value was 16% and the red blood cells numbered 800,000 per cubic millimetre. Bone marrow examination indicated aplastic anæmia. He had been treated with "Campolon" and iron without effect. During the next seven months he was given repeated transfusions of citrated blood, which were usually followed by febrile reactions and were only of temporary value. He was then given direct transfusions of unmodified blood, which were not followed by febrile reactions and were more effective in maintaining the blood count at a satisfactory level. Over a period of seven months he had been given seven direct transfusions; the last one was in August, 1940, and since then he had remained in good health and blood examinations had given normal results.

The second patient was a woman, aged fifty-eight years. Dr. McLean said that she had been first seen in May, 1939. Blood examination showed a hæmoglobin value of 28%; the red cells numbered 1,100,000 per cubic millimetre, the white cells 5000 per cubic millimetre. The test meal examination showed achlorhydria. Bone marrow examination showed increased erythropoiesis with a 5% incidence of megaloblasts. The condition was diagnosed as atypical pernicious anæmia and the patient was given injections of "Neohepatex". Her general condition and her blood count had improved and she continued to receive injections of various liver extracts; she suffered from allergic reactions, and desensitization was only of temporary value. To combat repeated relapses in her blood condition she had been given many direct blood transfusions; the number given between June, 1942, and June, 1946, was twenty-two. She was given "Hepamino" (a proteolysed liver preparation) and "Extralin" by mouth, instead of injections of liver extract, but her condition became worse. Until June, 1946, she had suffered from anorexia and occasional attacks of vomiting and diarrhœa. Her diet had been deficient, particularly in protein, and her serum protein content was found to be 4·9 grammes per 100 millilitres. Since June, 1946, she had been able to take a satisfactory diet with sufficient protein; she also had had crude liver extract injections without allergic reactions; her condition had improved, the blood count had remained at the normal level and she had received no transfusions. The condition had been diagnosed as nutritional macrocytic anæmia.

Dr. McLean's third patient was a man, aged forty-eight years, who had been admitted to hospital on June 6, 1946. He had gradually become weaker and more breathless on exertion over a period of eighteen months. Eleven days previously he had had a tooth extracted and his face had become swollen and painful. He had repeated epistaxis. Blood examination showed a hæmoglobin value of 36%; the red cells numbered 1,500,000 per cubic millimetre, the white cells 1600 per cubic millimetre, and the platelets 20,000 per cubic millimetre. Bone marrow examination indicated aplastic anæmia. He was given several transfusions of citrated blood, but epistaxis continued and he also had intermittent pyrexia. He was then given direct blood transfusions, which were more effective in controlling epistaxis, and the temperature remained normal. During the past ten months he had had sixteen direct transfusions. The most recent blood examination, on May 21, 1947, had shown a hæmoglobin value of 70% and a total red cell count of 4,000,000 per cubic millimetre.

Pneumococcal Meningitis.

DR. ERIC CLARKE showed a female patient, aged forty-six years, who had made a complete recovery from pneumococcal meningitis. She had been admitted to hospital in a deeply comatose state, having been at home with a cold for five days and having complained the day before of pain in the right shoulder and of cough. She had suddenly become unconscious two hours previously. Examination had revealed a slightly built, middle-aged woman, dyspnœic and comatose. Her temperature was 102° F., her pulse rate 106 per minute and her respiration rate 34 per minute. Breathing was rapid and shallow. Movement of the right side of the chest diminished; the percussion note was very dull at the base of the right lung posteriorly, where the breath sounds were markedly diminished; no adventitiæ were heard. Nothing abnormal had been found in heart or abdomen; the blood pressure was 110 millimetres of mercury (systolic) and 50 millimetres (diastolic). Some neck stiffness was present, but this was not marked; Kernig's sign was not elicited; there was some ptosis of the left eye, and the pupils were very dilated but reacted to light. Lumbar puncture had revealed that the cerebro-spinal fluid was under pressure of 250 millimetres of water; it was opalescent and contained fibrin strands; only 250 polymorphonuclear leucocytes per cubic millimetre were present, but an enormous number of Gram-positive cocci were found, which on incubation were identified as penumococci. No organisms had been grown from the blood. Treatment had been commenced with penicillin given intrathecally, 75,000 units being administered slowly by babottage. Dr. Clarke explained that the dose was in excess of what was usually regarded as safe and that 10,000 to 20,000 units would give a more than adequate concentration. Penicillin had been given intramuscularly, 25,000 units every three hours. Fluids had been introduced into the stomach through the Rehfuss tube; sulphadiazine was given by a similar route (three grammes immediately and then two grammes every four hours). Eight ounces of paraldehyde were given *per rectum*. Daily lumbar punctures had been performed for the first five days and 20,000 units of penicillin introduced into the theca. The cell count increased to 2200 per cubic millimetre on the third day and then fell. Attempts to grow organisms from the spinal fluid were unsuccessful after the first day, and no sign of subarachnoid block developed. By the fourth day the patient had regained consciousness, and medication by the intrathecal route was stopped after the fifth day. Sulphonamides and systemic administration were stopped on the eighth day. From the meningitis the patient had made an uninterrupted recovery, and in the ensuing six months had complained of some ache in the lumbar region and had had headaches on two occasions; in all other respects she had been perfectly normal. On the tenth day one ounce of slightly turbid straw-coloured fluid had been aspirated from the chest; that too had cleared satisfactorily. Dr. Clarke commented that the case was of interest because of the complete recovery after what was still regarded as a fatal infection. Attention was drawn to the carefully worked out plan and scheme of dosage as outlined by Cairns and his colleagues of the Oxford school.

Hepatitis.

Dr. Clarke's next patient was a married woman, aged forty-four years, who, three and a half months previously, had undergone a right radical mastectomy for a carcinoma of the breast with involvement of the axillary glands. For two and a half weeks she had complained of weakness, anorexia and nausea, and had been jaundiced for ten days. There had been no pain. On examination she was seen to be deeply jaundiced and thin, with a temperature of 100·4° F., pulse rate of 102 per minute, and respiration rate of 22 per minute. Her urine had been dark brown in colour and contained a marked excess of bilirubin, but no excess of urobilin or bile salts; her stools were clay coloured. Her liver edge had been palpable two fingers' breadth below the right costal margin, but was not excessively tender. The quantitative Van den Bergh test had revealed 11 milligrammes of bilirubin per 100 millilitres of plasma (the normal was below 0·8 milligramme), and the oral hippuric acid excretion test (1·7 grammes excreted) showed much

lowering of hepatic function, while a normal alkaline phosphatase value suggested that the jaundice was "toxic" in type rather than "obstructive" in spite of the urinary findings. The patient had had a remittent type of fever for about six weeks; her jaundice had lessened, but she became cholæmic to the point of delirium; her prothrombin time in the fifth week was 20% of normal. Gradually the tide had turned and her clinical condition had improved, together with the liver function test results, but it was not until the tenth week that her prothrombin time had risen to 90% and it was deemed safe to perform liver biopsy. The report by Dr. W. E. King on the biopsy specimen was as follows: "The section shows comparatively normal liver architecture, the liver cells show slight evidence of fatty change and some evidence of hyperplasia. Kupffer cells are prominent and there is some invasion of the liver lobule by inflammatory cells which appear to be migrating from the portal tracts. The portal tracts show an increased cellularity with a growth of young fibroblast tissue. The bile ducts show some evidence of hyperplasia." Liver function tests had returned to normal and the patient was fit and well.

Dr. Clarke said that the interesting points about the case were the long-continued remittent fever, the recovery in spite of most severe liver damage, and the relatively little abnormality seen in the biopsy specimen taken so soon after the acute phase of the illness. The illness had been complicated by severe *herpes zoster ophthalmicus*, which commenced on the ninth day.

Simmonds's Disease.

Dr. Clarke also showed some post-mortem specimens from a subject, a female patient, whom he had first seen in coma several hours before death. The striking absence of pubic and axillary hair had suggested an endocrine disturbance, but a normal blood pressure had rather put him off the scent of the correct diagnosis. He had later been able from various sources to piece together the following history. Twenty-two years previously, following the birth of her only child, she had had severe hæmorrhage and had been rushed into the Women's Hospital. Sepsis had followed. She had never menstruated since that event. Ten weeks previously she had been admitted to another hospital with a complaint of weakness and lack of energy since the birth of her child, of coldness and numbness of the hands and feet, and of shortness of breath for some years. For the preceding few months her hair had been becoming dry and coarse and was falling out, and she had had some epigastric discomfort. She had been regarded as being myxœdematous and was treated with thyreoid extract; she had lost weight and had lost her myxœdematous characteristics, but the medication had been discontinued owing to vomiting and diarrhœa. The thyreoid administration had been recommenced in large doses and the patient was discharged. Since her discharge from hospital the vomiting had continued for two weeks and she had then become comatose. Post-mortem examination had shown that the anterior lobe of the pituitary gland was almost completely replaced by fibrous tissue, the thyreoid and adrenal glands were grossly atrophic, and the uterus was infantile in type. The organs were displayed at the meeting and microscopic sections of them were shown. Dr. Clarke commented that the case illustrated all the features of what had been termed "pituitary myxœdema", with precipitation of adreno-cortical failure by thyreoid medication.

Ptosis Treated by Fascia Lata Graft.

DR. W. M. BOX showed a child, aged twelve years, who had been suffering from congenital bilateral ptosis due to weakness of each superior rectus muscle. Lexer's operation (implantation of a graft of *fascia lata*) had been performed on the right side in March, 1947, under general anæsthesia. The result was considered satisfactory; the lid edge was just above the pupillary margin and the child was able to close her lids.

Conical Cornea Treated with Plastic Contact Lenses.

Dr. Box also showed a female patient, aged twenty-three years, suffering from bilateral conical cornea. She had been fitted with plastic acrylic contact lenses and her visual acuity raised to $^6/_6$ in each eye

Demonstration of Human and Animal Torulosis.

DR. LEONARD B. COX AND MISS JEAN TOLHURST showed a series of preparations of *Torula* infections of human brain, cord and lungs, derived from thirteen subjects of torulosis. X-ray photographs of lungs were demonstrated showing large torular collections as well as the widespread fibrosis which resulted from the infestation. Cultures of *Torula histolytica* were shown together with microscopical preparations of the organism and histological material from infected tissue.

Prothrombin.

DR. P. FANTL, from the Baker Medical Research Institute, gave a demonstration of the different techniques for the determination of prothrombin time by the use of organ extracts (brain, lung) or Russell viper venom with and without activation by lecithin. The limitations of these techniques were pointed out. The clinical significance of hypoprothrombinæmia in hepatic disease, nutritional vitamin *K* deficiency and the influence of drugs on prothrombin activity was discussed. The prevention and treatment of thromboembolism using 3,3'ethylidene-bis-4-hydroxycoumarin were demonstrated.

Pathological Specimens.

DR. A. V. JACKSON presented a series of pathological specimens.

Adenoma of Adrenal Cortex.

In the first case a masculinizing tumour of ovary, adrenal or pituitary gland had been suspected in a twenty-year-old girl with excessive growth of hair on face and limbs, very large clitoris and labia, and some masculinity in her behaviour and sexual interests. Her daily output of urinary ketosteroids had averaged 100 milligrammes (normal 5 to 20 milligrammes), and a pyelogram by the intravenous method had shown displacement of the left kidney downwards by a large tumour. Dr. L. H. Ball had removed a large, spherical, well-encapsuled tumour weighing 24 ounces. Microscopically the specimen was seen to be a tumour of adrenal cortical tissue and, although it was not unquestionably malignant, the degree of nuclear variation suggested that the prognosis should be guarded.

Congenital Fibrocystic Disease of the Pancreas.

The organs from two patients were presented. A boy, aged two and a half years, had had dyspnœa, cyanosis and cough, and persistently offensive greyish stools since the age of twenty months. Autopsy had shown gross suppurative bronchitis and bronchiolitis, and marked pancreatic fibrosis with early cystic dilatation of the ducts. There was extreme and uniform fatty infiltration of the liver.

The other patient, a boy, aged sixteen years, had had bronchiectasis for five years, but no symptoms referable to the alimentary tract. There had been no diarrhœa, and the stools, although not specially examined, were apparently normal. At autopsy there was found advanced bronchiectasis with multiple pulmonary abscesses, and the pancreas showed cystic fibrosis.

Dr. Jackson pointed out that these two cases were in line with recent investigations showing some connexion between pulmonary fibrosis and bronchial suppuration. It had been stated that the pancreatic fibrosis was the primary lesion and that the pulmonary disease was a secondary vitamin *A* deficiency. However, it seemed more likely that the basis of the disease was a congenital inadequacy of secretory epithelium, and particularly of respiratory and pancreatic epithelium.

Amyloid Disease.

Dr. Jackson demonstrated a liver and kidneys showing amyloid disease and remarked that amyloidosis was rare, except at sanatoria. The patient, a female, aged thirty-nine years, had had pulmonary tuberculosis for ten years and at autopsy had been found to have also renal and laryngeal tuberculosis. A point of interest was a greenish-blue coloration of all organs, particularly the kidneys. The coloration, which became apparent only some minutes after the organs at autopsy had been incised and exposed to the air, was, not unreasonably, rather puzzling, until it was learnt that the patient had been taking, before admission, very large doses of methylene blue by mouth in an attempt to relieve her pain and urinary frequency.

Polycystic Disease of the Kidney.

Dr. Jackson then showed kidneys from a male subject, aged thirty-three years, who had been well until twelve months before. Then loss of energy, shortness of breath, hæmaturia and giddiness had finally terminated in uræmia and bronchopneumonia. At autopsy the kidneys had shown typical polycystic disease and the right and left kidneys weighed 27 ounces and 39 ounces respectively. Three aunts and one brother of the patient had died from "kidney trouble", but whether any of these had true polycystic disease was not determined.

Cystadenomata of the Pancreas.

The last specimens discussed were from a female patient, aged forty years, who had "always" had an aching

pain in the left side of the abdomen. Five months before operation she had noticed a mobile lump in the abdomen. Examination had revealed nothing significant except a large mobile mass in the left hypochondrium. The results of investigations (pyelogram by the intravenous method, blood examinations, Casoni and hydatid complement fixation tests) all had been essentially negative. At exploratory laparotomy by Dr. A. Rowlands two large ovoid cysts, each four inches in their longest diameter, had been found attached to the tail of the pancreas. The cysts were not actually contained in the pancreatic substance, but were under the peritoneum over the pancreas. Pathologically the interest in these cysts lay in their resemblance to pseudomucinous cystadenomata of the ovary. They were multilocular, contained blood-stained mucinous material and were lined by the same characteristic tall columnar mucus-secreting epithelium, which resembled large bowel epithelium. Dr. Jackson said that they were probably related to the so-called "entero-cystomata" found occasionally attached to the small bowel, to the mesentery or even in the thorax.

Conditions of Surgical Interest.

DR. JOHN DEVINE showed two patients with conditions of surgical interest. These cases will be reported in full in another issue of the journal.

Medical Societies.

THE AUSTRALASIAN ASSOCIATION OF PSYCHIATRISTS.

A MEETING of the Australasian Association of Psychiatrists will be held at Sydney on October 22 and 23, 1947. The programme is as follows.

Wednesday, October 22.

11.30 a.m.—Council meeting at British Medical Association House, council room.
1 p.m.—Members of Council entertained at luncheon by Dr. Grey Ewan.
2 p.m.—General meeting at Robert H. Todd Assembly Hall, British Medical Association House.
2.30 p.m.—Paper by Dr. S. J. Minogue: "Alcoholics Anonymous".
6.10 p.m.—Visiting members entertained at dinner.
8 p.m.—Presidential address to be delivered by Dr. H. F. Maudsley ("Some Ideals for a Psychiatric Service") at the Stawell Hall of the Royal Australasian College of Physicians. (Academic dress.)

Thursday, October 23.

10 a.m.—Demonstrations of cases and electroencephalography at Royal Prince Alfred Hospital in A2 lecture theatre.
1 p.m.—Luncheon at Broughton Hall.
2.15 p.m.—Clinical meeting at Broughton Hall Psychiatric Clinic, Leichhardt.
8 p.m.—Evening session at Robert H. Todd Assembly Hall, British Medical Association House. Paper by Dr. R. Coupland Winn: "Psycho-Analysis and Other Forms of Psychotherapy".

All members of the British Medical Association are invited to attend the presidential address by Dr. H. F. Maudsley on October 22, and the session on October 23, when Dr. R. C. Winn will read a paper.

Post-Graduate Work.

POST GRADUATE COMMITTEE IN MEDICINE: THE UNIVERSITY OF ADELAIDE.

APPROACHING COURSES.

THE Post Graduate Committee in Medicine of the University of Adelaide announces the following courses of study.

Week-End Course in Medicine.

The week-end course in medicine will be held on Saturday, November 15, and Sunday, November 16, 1947.

The subject of the course will be "Diabetes". Further details will be published later.

Pathology: Demonstration of Post-Mortem Material.

Demonstrations are carried out at the Institute of Medical and Veterinary Science every Wednesday at 3.30 p.m. A large amount of interesting material is dealt with at each session. Practitioners are invited to attend one demonstration before enrolling for a course of twelve. The fee for such a course is £3 3s. The last demonstration for 1947 will be given on December 17 and the first for 1948 on January 28.

Course Suitable for M.R.A.C.P. Candidates.

A full-time course of twelve weeks' duration suitable for M.R.A.C.P. candidates will be held from Monday, February 2, to Saturday, April 24, 1948. It will consist of case-taking, tutorials, lecture demonstrations, ward rounds, demonstrations in electrocardiography, in diseases of the central nervous system, in *fundus oculi* conditions, in radiology, in post-mortem material and in pathology.

The fee for the course is 25 guineas. Any graduate who wishes to attend this course and has not yet applied should do so as soon as possible. The next course will not be until July, 1949. Cheques should be forwarded to the Medical Secretary before January 24, 1948.

Course Suitable for M.S. Part I Candidates.

A course in anatomy and physiology of twelve weeks' duration suitable for candidates for the M.S. Part I examination will begin on Monday, February 9, 1948. Anatomy lectures will be given in the anatomy department on five afternoons at 4.30 o'clock. Physiology lectures will be given in the physiology department on Monday, Tuesday, Thursday and Friday mornings from 9 to 10 o'clock.

The fee for this course is 25 guineas. Any graduate who wishes to attend the course and has not yet applied should do so as soon as possible. The next course will not be until July, 1949. Cheques should be forwarded before January 24, 1948, to the Medical Secretary, Institute of Medical and Veterinary Science, Frome Road, Adelaide.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 188, of October 2, 1947.

AUSTRALIAN MILITARY FORCES.

Australian Army Medical Corps.

QX46759 Lieutenant-Colonel (Temporary Colonel) C. E. S. Jackson relinquishes command of No. 112 (Brisbane) Military Hospital and is placed upon the Regimental Supernumerary List, 2nd April, 1947.

NX102551 (NP10081) Major (Temporary Lieutenant-Colonel) J. R. Nimmo relinquishes command of No. 115 (Heidelberg) Military Hospital and the rank of Temporary Lieutenant-Colonel, 18th May, 1947.

WX3326 Lieutenant-Colonel L. E. Le Souef, E.D., is transferred from the Permanent Supernumerary List (Australian Army Medical Corps), ceases to be seconded for duty with the Australian Imperial Force, and resumes duty in the Active Citizen Military Forces with the rank of Lieutenant-Colonel, 22nd May, 1946.

TX2140 Captain (Temporary Lieutenant-Colonel) J. W. H. Merry relinquishes command of 20th Australian Field Ambulance and is placed upon the Regimental Supernumerary List, 31st March, 1947.

NX36 Lieutenant-Colonel (Temporary Colonel) G. F. Hill relinquishes command of No. 113 (Concord) Military Hospital and is placed upon the Regimental Supernumerary List, 18th May, 1947.

QX46759 Lieutenant-Colonel (Temporary Colonel) C. E. S. Jackson relinquishes the temporary rank of Colonel and is transferred to the Reserve of Officers (Australian Army Medical Corps), 12th April, 1947.

The notification respecting SX19025 Captain J. M. McPhie which appeared in Executive Minute No. 55 of 1947, promulgated in *Commonwealth Gazette*, No. 85 of 1947, is withdrawn.

SX19025 Captain J. M. McPhie is transferred from the Australian Imperial Force to the Active Citizen Military Forces with the rank of Captain, 17th October, 1946 (in lieu of the notification respecting this officer which appeared in Executive Minute No. 261 of 1946, promulgated in *Commonwealth Gazette*, No. 5 of 1947).

The following officers are placed upon the Regimental Supernumerary List: S41475 Lieutenant-Colonel H. W. Wunderly, 2nd May, 1947, NX206859 Captain R. D. Rothfield, 17th April, 1947, and QX 57362 Captain (Temporary Major) R. L. Quinn, 12th March, 1947.

SX34383 Captain N. D. Abbott is transferred from Australian Army Medical Corps (Medical) Reinforcements, 17th April, 1947.

To be Temporary Colonel, 22nd May, 1946.—Lieutenant-Colonel L. E. Le Souef, E.D., and is appointed Deputy Director of Medical Services, Head-quarters, Western Command (Part Time Duty).

No. 115 (Heidelberg) Military Hospital.—VX504193 Captain F. Grunseit is transferred to Australian Army Medical Corps Reinforcements, 5th May, 1947.

To be Captain, 30th April, 1947.—VX 504193 Fery Grunseit.

Australian Army Medical Corps Reinforcements.—VX504193 Captain F. Grunseit is transferred from Australian Army Medical Corps, 5th May, 1947.

Reserve of Officers.

Australian Army Medical Corps.

The undermentioned officers are transferred to the Reserve of Officers on the dates indicated. Where applicable, they cease to be seconded and relinquish any temporary rank held with effect from the date of transfer to the Reserve of Officers.

Captains NX34858 F. N. Street, M.C., 22nd February, 1947, NX206852 M. Bell, 17th April, 1947, and NX200030 W. S. Kennedy, NX203586 J. L. Butler, NX203587 M. S. Henry and NX203548 I. D. Byrne, 22nd April, 1947.

101st Australian General Hospital.—NX203243 Captain D. J. Wurth, 15th April, 1947.

No. 105 (Adelaide) Military Hospital.—SX33402 Captain R. J. Sawers, 10th April, 1947.

No. 110 (Perth) Military Hospital.—WX31924 Captain M. Connaughton, 17th April, 1947.

No. 112 (Brisbane) Military Hospital.—QX59681 Captain (Temporary Major) G. G. MacDonald, 22nd April, 1947, and NX203551 Captain H. L. Davis, 23rd April, 1947.

No. 113 (Concord) Military Hospital.—Captains NX203809 K. J. Lazarus, 22nd April, 1947, NX204411 W. B. Grant, 30th April, 1947, NX203557 C. J. Love, 29th April, 1947, NX203493 J. A. Keen, 30th April, 1947, NX203565 R. H. Vines, 29th April, 1947, and NX208035 I. F. Potts, 1st May, 1947.

No. 115 (Heidelberg) Military Hospital.—Captains VX94146 D. C. Cowling, 10th April, 1947, and VX91437 N. C. R. Merrilees, 3rd April, 1947, NX141960 Captain (Temporary Major) J. McB. White, 16th April, 1947, and Captains VX95023 A. C. Salwin, 23rd April, 1947, and NX206862 L. D. Wheeler, 1st May, 1947.

16th Australian Camp Hospital.—NX203553 Captain P. D. Hipsley, 22nd April, 1947.

Inter-service Medical Wing Demobilization Centres (Australian Military Forces Component).—Captains NX203554 D. L. Hobson, 10th April, 1947, NX204899 J. Couani, 15th April, 1947, NX204898 T. W. Edmeades and NX206863 C. O. Hughes, 17th April, 1947, and VX138666 W. M. G. Leembruggen, 16th April, 1947, SX23066 Captain (Temporary Major) P. G. Jay, 17th April, 1947, and NX203555 Captain N. G. Hoddle, 2n2d April, 1947.

Q272024 Captain (Temporary Major) A. H. G. McIntyre, 8th May, 1947, VX94147 Captain W. A. Cooper, 7th May, 1947, NX12269 Major S. J. M. Goulston, M.C., 31st May, 1947, and Captains NX206857 L. T. Milgate, 29th May, 1947, and SX34385 M. S. Cooling, 23rd May, 1947.

No. 110 (Perth) Military Hospital.—NX208030 Captain A. R. Burkitt, 14th May, 1947.

No. 112 (Brisbane) Military Hospital.—Captains Q273987 L. I. Burt, 3rd May, 1947, and NX203588 D. C. Henchman, 22nd May, 1947.

No. 113 (Concord) Military Hospital.—Captains NX142876 D. W. Oakley, 22nd May, 1947, and NX208066 B. E. Frecker, and NX208059 J. G. Dickson, 5th June, 1947.

No. 115 (Heidelberg) Military Hospital.—Captains VX97061 K. H. Morrison, 22nd May, 1947, N482886 W. D. Richards, 14th May, 1947, NX203547 V. J. Bennett, 22nd May, 1947, VX96415 T. D. Hoban, 29th May, 1947, and VX93533 A. L. Williams and VX96328 V. Wynn, 4th June, 1947.

34th Australian Camp Hospital.—NX206860 Captain N. L. Stephenson, 3rd June, 1947.

Inter-Service Medical Wing Demobilization Centres (Australian Military Forces Component).—Captains NX206855 S. R. Hing, 3rd June, 1947, NX206861 A. C. G. Thomas, 31st May, 1947, and SX34117 K. V. Sanderson, 10th May, 1947.

The undermentioned officers are transferred to the Reserve of Officers on the dates indicated, and where applicable they cease to be seconded. Officers holding temporary rank relinquish such temporary rank on the date of transfer to the Reserve of Officers and are granted from such date honorary rank on the Reserve of Officers equivalent to the temporary rank relinquished.

No. 114 (Goulburn) Military Hospital.—NX12289 Captain (Temporary Major) D. S. Brandt, 30th April, 1947.

No. 113 (Concord) Military Hospital.—VX193 Captain (Temporary Major) N. R. Godby, 8th May, 1947.

71st Australian Camp Hospital.—QX34530 Captain (Temporary Major) H. J. Rowe, 28th May, 1947.

Retired List.

Australian Army Medical Corps.

The undermentioned officers are placed upon the Retired List on the dates indicated with permission to retain their present substantive rank and wear the prescribed uniform. Where applicable, they cease to be seconded and relinquish any temporary rank held, with effect from the date of placement upon the Retired List.

No. 110 (Perth) Military Hospital.—WX23381 Captain H. R. Elphick, 11th April, 1947.

Q142712 Major C. Shellshear, E.D., 10th May, 1947.

No. 113 (Concord) Military Hospital.—N282701 Lieutenant W. G. McKenzie, 5th June, 1947.

Reserve Citizen Military Forces.

Australian Army Medical Corps.

2nd Military District.—Captain R. A. Playoust is retired, 30th April, 1947. *To be Honorary Captain, 2nd May,* 1947—William Robert Vautin.

3rd Military District.—Lieutenant F. J. Collins is placed upon the Retired List with permission to retain his rank and wear the prescribed uniform, 30th April, 1947. Lieutenant G. W. Trinca is transferred from the Reserve of Officers (Australian Infantry), 5th March, 1945. *To be Honorary Captain, 5th March,* 1945—Lieutenant G. W. Trinca.

4th Military District.—To be Honorary Captain, 9th April, 1947—Graham Bristow Fisk.

5th Military District.—Honorary Captain P. J. Orton is retired, 24th April, 1947. Major T. C. Anthony is retired, 17th April, 1947.

2nd Military District.—Major M. M. Kennedy is retired, 28th May, 1947. *To be Honorary Captain, 21st May,* 1947—Lewsbe George Abbott.

3rd Military District.—Captain E. A. N. MacKnight is retired, 28th May, 1947.

4th Military District.—Major C. F. Pitcher is placed upon the Retired List with permission to retain his rank and wear the prescribed uniform, 29th May, 1947. *To be Honorary Captain, 21st May,* 1947—John Nelson Diggle.

Royal Australian Air Force.

General Duties Branch.

The appointment of Temporary Squadron Leader C. C. Greenwell (263714) is terminated on demobilization, 16th August, 1947.

Citizen Air Force: Medical Branch.

Earle Fead Northcroft (266734) is appointed to a commission with the temporary rank of Squadron Leader, 22nd August, 1947, for duty as a Physician Specialist, part time.

The approval given in Executive Council Minute No. 259 of 1945 to the transfer from the Reserve to the Active List of Flight Lieutenants W. M. Calanchini (257721) and J. L. Fordyce (257695), as notified in *Commonwealth of Australia Gazette* No. 216, dated 8th November, 1945, is withdrawn.

Reserve: Medical Branch.

The appointment of Flight Lieutenant E. F. Northcroft (266734) is terminated, 21st August, 1947.—(Ex. Min. No. 63.—Approved 17th September, 1947.)

Correspondence.

MANAGEMENT OF HAND INJURIES.

SIR: There are a number of questions that have come to mind after reading the articles (and the ensuing discussions) by Dr. Callow and Dr. Woodland in the journal of September 20, 1947. Perhaps one or both authors would be willing to supply answers to these questions:

1. "Little attention is given to it (subject of management of hand injuries) in the medical schools . . ."

Q.: On what evidence is this opinion based?

2. "These injuries may be left to the care of an inexperienced house surgeon . . ." The mere calling attention to this is not a sufficient remedy for an unsatisfactory state of affairs and will not make the position any better.

Q.: What action and what organization are recommended to provide better management of injuries in question?

3. "I would prefer my own work to be judged on patients I have treated for compound fractures of the femur rather than fractures of the proximal phalanx . . ."

Q.: How, then, is it proposed that the general practitioner who treats such cases only occasionally should be trained to manage the treatment of such injuries?

4. If the management of these hand injuries is considered to be the work that the general practitioner should do, and seeing that there is an ever-increasing number of medical students and ever-increasing specialization within the specialty of surgery,

Q.: How many orthopædic surgeons would be required for the practical instruction of 100 medical students in a teaching hospital (orthopædics is used in the sense of bone and joint injury and disease)?

5. "One final question"—for Dr. Grieve, as they say in the Forum of the Air: "It was deplorable that so few members of the profession had attended the meeting . . ."

Q.: What are the reasons for this "deplorable state of affairs"?

Yours, etc.,
E. S. Meyers.

The University of Queensland Medical School,
Brisbane.
October 2, 1947.

SURGICAL ASPECTS OF POST-OPERATIVE TREATMENT.

Sir: In a paper by Dr. Alwynne Rowlands published in the journal of September 27, and entitled "Surgical Aspects of Post-Operative Treatment", some statements are made under the heading of "The Maintenance of Fluid Balance" which I feel do not represent modern thought, one statement constituting advocacy of a dangerous procedure. He states: "Coller and Maddock have shown that after an operation the patient of average weight loses 1500 millilitres of fluid a day in the form of water vapour from the lungs and skin." It is true that in special circumstances up to 100 ounces may be lost per day in this way, and that for the day following operation 70 ounces constitute a fair average, but in most cases for all subsequent days 30 ounces per day is often, in a Victorian climate, more than adequate.

The "clinical rule" which Dr. Rowlands attributes to Bartlett reads: "For each 100 milligrammes that the plasma chloride level needs to be raised to reach the normal (560 milligrammes *per centum*) the patient should be given 0·5 gramme of sodium chloride per kilogram of body weight." Coller, Maddock, Bartlett and others recommended the use of this rule in 1938 and again in 1940. It was subsequently quoted as being their "clinical rule" in standard American textbooks, such as Mason and Zintel's "Pre-Operative and Post-Operative Treatment" (1946), Christopher's "Text Book of Surgery" (1944), Bialock's "Principles of Surgical Care" (1940), and in numerous surgical papers. However, in 1944, Coller and others[1] retract this "rule" with these words: "These cases have convinced us that the use of the 'Clinical rule' is dangerous . . . and that it should not be employed. It is recommended that the correction of fluid deficiency states be made upon the basis of the physiologic response to test doses of the appropriate salt solution rather than upon the basis of the plasma chloride, the CO_2 combining power, the N.P.N., the plasma protein or the hæmoglobin levels." With these sentiments I am in complete agreement. If one compares the amount of saline indicated by calculations based on non-biochemical data that I have described elsewhere[2] with those indicated for the same patient by application of the "clinical rule", it will be found that the latter often will exceed the former by pints of normal saline per day. The importance of this will be obvious when one appreciates that in patients not experiencing fluid loss by abnormal routes (vomiting *et cetera*), the amount of normal saline indicated according to the former method of calculation is one and a half pints for the first post-operative day and a maximum of one pint for each subsequent day.

Dr. Rowlands's statement that "In cases of impaired renal function or in the surgical case in which the patient is seriously ill, the requirements of sodium chloride are less" does not quite indicate the true position. Circumstances may exist (for example, where bile drainage is profuse and prolonged, or where there is profuse loss through an ileostomy or diarrhœa) where renal function may be inadequate but sodium depletion is marked. In such cases sodium is urgently required. If renal function were adequate, normal saline would be given with the knowledge that the excess chloride ion would be excreted by the kidneys. However, where renal failure resulting in a tendency to acidosis exists, the administration of sodium in combination with a strong acid radicle, such as the chloride ion, would be fraught with danger in that the accumulation of the latter ion might increase the acidosis beyond tolerable limits. However, the sodium can be given combined with a weak acid radicle, namely, the lactate radicle, which is rapidly and readily oxidized after administration, so liberating the sodium ion. Thus one can deal with any water-electrolyte deficiency problem by using varying combinations of normal saline, 5% glucose in water, and Hartman's solution (sodium lactate Ringer's solution). One must remember when contemplating using glucose solutions stronger than 5%, that glucose regularly appears in the urine of all sick patients having 5% glucose solutions intravenously. As their condition improves this glycosuria disappears.

Dr. Rowlands's recommendation of the administration of half a litre of plasma every forty-eight hours where prolonged intravenous therapy is being used is of major importance. Unfortunately serum is dispensed in one-litre bottles, a relic of the recent war. For peace-time use such is uneconomical, and in a recent letter Dr. Lucy Bryce informs me that she is of the same opinion, but that half-litre bottles are unobtainable owing to manufacturing difficulties, and that the Red Cross Transfusion Services of New South Wales and Queensland at present oppose dispensing serum in units of less than one litre.

Yours, etc.,
Charles Gale.

Geelong,
Victoria.
October 3, 1947.

References.

(1) F. A. Coller, K. N. Campbell, H. H. Vaughan, L. V. Iob, and C. A. Moyer: "Post-Operative Salt Intolerance", *Annals of Surgery*, Volume CXIX, April, 1944, page 533.

(2) C. Gale: "The Fluid Balance Chart", *The Australian and New Zealand Journal of Surgery*, Volume XVI, Number 1, July, 1946, page 44.

Obituary.

SYDNEY FANCOURT McDONALD.

The late Sydney Fancourt McDonald, affectionately known as "S.F." to his colleagues and to generations of resident medical officers at the Brisbane Children's Hospital, was born at Rocklea, near Brisbane, in 1884, and began his education at the Brisbane Grammar School and at Trinity College, Melbourne. Both of these seats of learning remained dear to him. His last recorded address was delivered at the Brisbane Grammar School. On this occasion, referring to the death of Professor Marshall Allan, he said: "His sense of duty forbade him to take the rest which might have given him a few more years." Probably none of his audience realized how accurately the speaker described himself. Of his time at Trinity, men who were in college with him forty years ago write that while there "he played an abiding part". He graduated M.B., B.S. in 1909 and proceeded to the M.D. in 1912. The next year found him in England and he was working at Queen Charlotte's Hospital at the outbreak of war in August, 1914. McDonald, while still in Australia, had commanded the Melbourne University Rifles and, according to one who served under him, had stimulated the detachment into the highest grade of efficiency. Caught in England by the war, he had the choice of enlisting with the British Army or of returning home to join an Australian unit. He chose the former course, and with the Royal Army Medical Corps was in France soon enough to take part in the retreat from Mons. He remained with the Royal Army Medical Corps throughout the war and had a distinguished career in France. One who was with him there writes: "It is difficult to express just what Captain McDonald meant to us all at No. 46 Stationary Hospital, Étaples. When we were busy his energy, tact and friendliness were an inspiration to all, and he was approachable to all who needed him. During the very bad air-raids—all the worse for being on hospitals—his behaviour was an example to all of us and those who may have felt a little anxious were assured and strengthened to carry on with jobs that needed cool, calculated courage under such circumstances."

After demobilization, McDonald remained in England to acquire the Membership of the Royal College of Physicians of London, and he returned to Australia in 1920. For the

rest of his life he never forgot England, or her people, or the friends he had made during those years. He kept up a regular correspondence with many of them. Over a quarter of a century later one of them writes: "I shall miss his cheery letters covering a period from 1920 when he left England. Almost an unique correspondence, I suppose .... For us at home he will always remain a vivid and happy memory, not only for his letters but for the many practical kindnesses he has literally showered upon us. At the first he sent two cheques to cover damage to the books in my (public) library which he thought had been bombed .... Then came his welcome parcels. Had he lived to be a hundred he would then not know how much they have meant to us and others."

Back in Brisbane, McDonald commenced practice as a physician, specializing as far as possible in diseases of children, and he was appointed almost immediately as honorary physician to out-patients at the Hospital for Sick

Children. After some years he became senior honorary physician and continued to visit the hospital regularly until his retirement from the active staff in 1946.

He was always interested in the corporate life of his profession and took part in the affairs of the Queensland Branch of the British Medical Association. For many years he served as a member of the council and he also held the office of president. He was president of the Section of Pædiatrics in the Fourth Session of the Australasian Medical Congress (British Medical Association), held at Hobart in 1934. He made many contributions to medical literature and delivered the Stawell Oration in 1943. He was one of those who never failed to come to the assistance of the Editor of this journal when occasion arose; his help was given willingly and with no delay. He was a stickler for the right use of words and would have met with the approval of A. P. Herbert ("What a Word!"). He was a foundation Fellow of the Royal Australasian College of Physicians. He became a Member of the Royal College of Physicians of London in 1919 and in 1940 was elected Fellow.

McDonald was always interested in flying and he qualified as a commercial pilot. Of his service with the Royal Australian Air Force during the second World War, Air-Commodore Daley has written. For many years McDonald was consulting physician to the Repatriation Hospital, Rosemount.

As a young man his sporting interests were mainly tennis and rifle shooting. He continued to play tennis until prevented by a slight stroke about three years ago. He was very interested in photography and at the time of his death had a magnificent collection of photographs of disease states in children. Many were the occasions when he would arrive at the Children's Hospital to do his rounds, with his bag in one hand and his camera in the other. And, no matter how busy, he would come any day of the week to photograph some clinical condition that would not keep until his next official visit. He was very fond of the Barrier Reef and always went to Heron Island for his holidays, but not to rest. Such was his energy and enthusiasm for finding and studying new species of bird and marine life that he would exhaust his companions and overtax himself. He always preferred his camera to a gun.

While in England in 1919 he married Marjorie Peck, of Melbourne, who was serving with the Army Nursing Services. She died in 1939, after years of ill health, courageously borne, and she was helped, it is certain, by her husband's cheeriness and devotion, which were obvious to all who knew him. Early in 1942 he married Miss Jean Darvall, of Brisbane.

For many years he was Brisbane's best-known pædiatric physician. He had rooms on the ground floor of "Craigston", and a delightful flat high up in the same building, overlooking most of Brisbane. Here he spent his last weeks. To the end he was a voracious reader. His library of non-medical books was one of the best in Brisbane. To his friends "S.F." appeared to have a superhuman capacity for remembering and quoting from any book one liked to mention. One of them has written that he will miss "his shyness and awkwardness in conversation, which never left him except at odd moments, when he relaxed at afternoon tea at the Children's Hospital or of an evening in his own home; his ready enthusiasm for any conversation about books, of which he seemed to have read more than anyone I ever knew; his odd stiff little bow on greeting you and at the end of conversation". This friend has also said that, though others will tread in his footsteps they will not fill his shoes. To be able to do this would be an ambition, difficult of attainment but well worth while.

Dr. T. H. R. Mathewson writes: It gives me great pleasure to accede to a request to write an appreciation of the late Dr. S. Fancourt McDonald, or "Mac" as he was affectionately known to some of his friends. It is unfortunate that many of those with whom he came into intimate contact in his work and who would have been able to pay tribute worthy of him, have predeceased him.

He and I were colleagues on the honorary staff of the Children's Hospital, Brisbane, for a number of years. My association with him was chiefly in connexion with clinical meetings at the hospital and post-graduate work. Dr. McDonald was an erudite physician who was well versed in all branches of medicine, with a predilection for and a special knowledge of diseases of children. He was interested in psychological medicine, which proved of value to him in dealing with behaviour disorders in children. Obscure conditions, such as diseases of the endocrine system, were a delight to him, and he possessed a collection of photographic slides by the aid of which he was able to give a most interesting and instructive talk to a medical audience.

Few medical men had such a wide knowledge of literature, which was demonstrated on at least one occasion, when he read before the Queensland Branch of the British Medical Association a paper on "Medicine in Literature". This knowledge, together with his keen observation, his powers of description and his ability to cite cases from his own experience, made him a most successful lecturer and teacher. His demonstrations at clinical meetings were always greatly appreciated. He exercised extreme patience and care in taking histories and made an exhaustive investigation of the condition of every patient who came under his care.

As a consultant his opinion was highly valued, and his advice and help were sought by a large number of medical practitioners. Dr. McDonald was not an easy man to get to know, but his attentiveness, thoughtfulness, generosity and practical sympathy were well known to all who became his patients, as well as to his friends and colleagues who were ill. Those of us who were privileged to accept his hospitality know what an excellent host he was.

By Dr. McDonald's death the profession, not only in Queensland but in Australia, has lost a physician and the medical school in Queensland a teacher of outstanding ability who worthily upheld the highest traditions of medical science.

Air-Commodore E. A. Daley, Director-General of Air Medical Services, writes: With the passing of Dr. S. F.

McDonald the Air Force Medical Service has lost a valuable consultant and flying men a great friend.

Group Captain McDonald's connexion with airmen goes back to 1928, when he was first appointed as a wing commander, examiner and medical consultant to the Royal Australian Air Force and civil aviation in Brisbane. Since that date he associated himself actively with all aviation medical problems in connexion with this work and kept valuable records of his impressions of men referred to him by the service for examination and treatment. Tropical service was also, even in those times, a matter of grave concern to him, and he was one of the few who early stressed the problems to be faced when fighting under these conditions.

Owing to the position of Brisbane as a war-time city he became a key man in this work and did great service in handling the many problems, such as pilot fatigue and other aviation medical matters, associated with combat flying personnel. Ground staff also benefited by his advice and fatherly interest. Not satisfied with the valuable aid he was rendering as a part-time consultant in medicine, a member of medical boards and an examiner for civil aviation, he rendered a period of whole-time service and proceeded to New Guinea.

Over the years hundreds of servicemen and civil pilots passed through his hands, and his notes concerning them always included more than a mere clinical report. Each one gave an insight into the man's personality and was always extremely valuable in making assessments. This conscientious and very personal interest in aviation medical work was continued up until within a few weeks of his death.

He will be greatly missed by the service, for he was admired and respected by both medical officers and flying men. Their last tribute was paid with full Air Force honours.

Dr. A. P. Derham writes: I was one of the original small band who enlisted with S. F. McDonald at the inaugural parade of the Melbourne University Rifles in 1910, and endured with him the horrors of being marched and countermarched across ploughed fields in our early manœuvres with more highly trained units. We would gladly have done much more for S. F. McDonald, but I do not think I have met any other commanding officer who could have demanded so much from university students without an immediate mutiny.

We all loved him and have loved and admired him ever since. He has always stood in my mind as one of the few men I have known who were both great and good.

THEODORE AMBROSE.

WE regret to announce the death of Dr. Theodore Ambrose, which occurred on October 8, 1947, at Perth.

Medical Appointments.

Dr. D. Gordon has been appointed health officer (industrial hygiene), Department of Health and Home Affairs, Brisbane, in pursuance of the provisions of *The Public Service Acts*, 1922 *to* 1945, and *The Health Acts*, 1937 *to* 1946, of Queensland.

Dr. W. A. A. Mackey has been appointed government medical officer at Southport and a health officer, in pursuance of the provisions of *The Health Acts*, 1937 *to* 1946, of Queensland.

Dr. R. N. Reilly has been appointed honorary clinical assistant in the ear, nose and throat department, Royal Adelaide Hospital, Adelaide.

Dr. C. M. Gurner has been appointed honorary clinical assistant to the radio-diagnostic section, Royal Adelaide Hospital, Adelaide.

Books Received.

"Inter-Allied Conferences on War Medicine, 1942-1945: Convened by the Royal Society of Medicine"; honorary editor, Major-General Sir Henry Letheby Tidy, K.B.E., M.D., assistant editor, J. M. Browne Kutschbach, M.B., B.Ch., D.P.H.; 1947. New York and Toronto: Staples Press, Limited. 8½" × 5½", pp. 532, with illustrations. Price: 50s.

"Blood Pressure and its Disorders, including Angina Pectoris", by John Plesch, M.D. (Budapest), M.D. (Germany), L.R.C.P. and S. (Edinburgh and Glasgow); Second Edition; 1947. London: Baillière, Tindall and Cox. 8½" × 5½", pp. 322, with many illustrations. Price: 21s.

"Office Treatment of the Eye", by Elias Selinger, M.D.; 1947. Chicago: The Year Book Publishers, Incorporated. 9" × 6", pp. 542, with many illustrations. Price: $7.75.

Diary for the Month.

OCT. 21.—New South Wales Branch, B.M.A.: Medical Politics Committee.
OCT. 22.—Victorian Branch, B.M.A.: Council Meeting.
OCT. 23.—New South Wales Branch, B.M.A.: Clinical Meeting.
OCT. 24.—Queensland Branch, B.M.A.: Council Meeting.
OCT. 28.—New South Wales Branch, B.M.A.: Ethics Committee.
OCT. 30.—New South Wales Branch, B.M.A.: Branch Meeting.
NOV. 4.—New South Wales Branch, B.M.A.: Organization and Science Committee.
NOV. 5.—Western Australian Branch, B.M.A.: Council Meeting.
NOV. 5.—Victorian Branch, B.M.A.: Branch Meeting.
NOV. 6.—South Australian Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute; Brisbane City Council (Medical Officer of Health). Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

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